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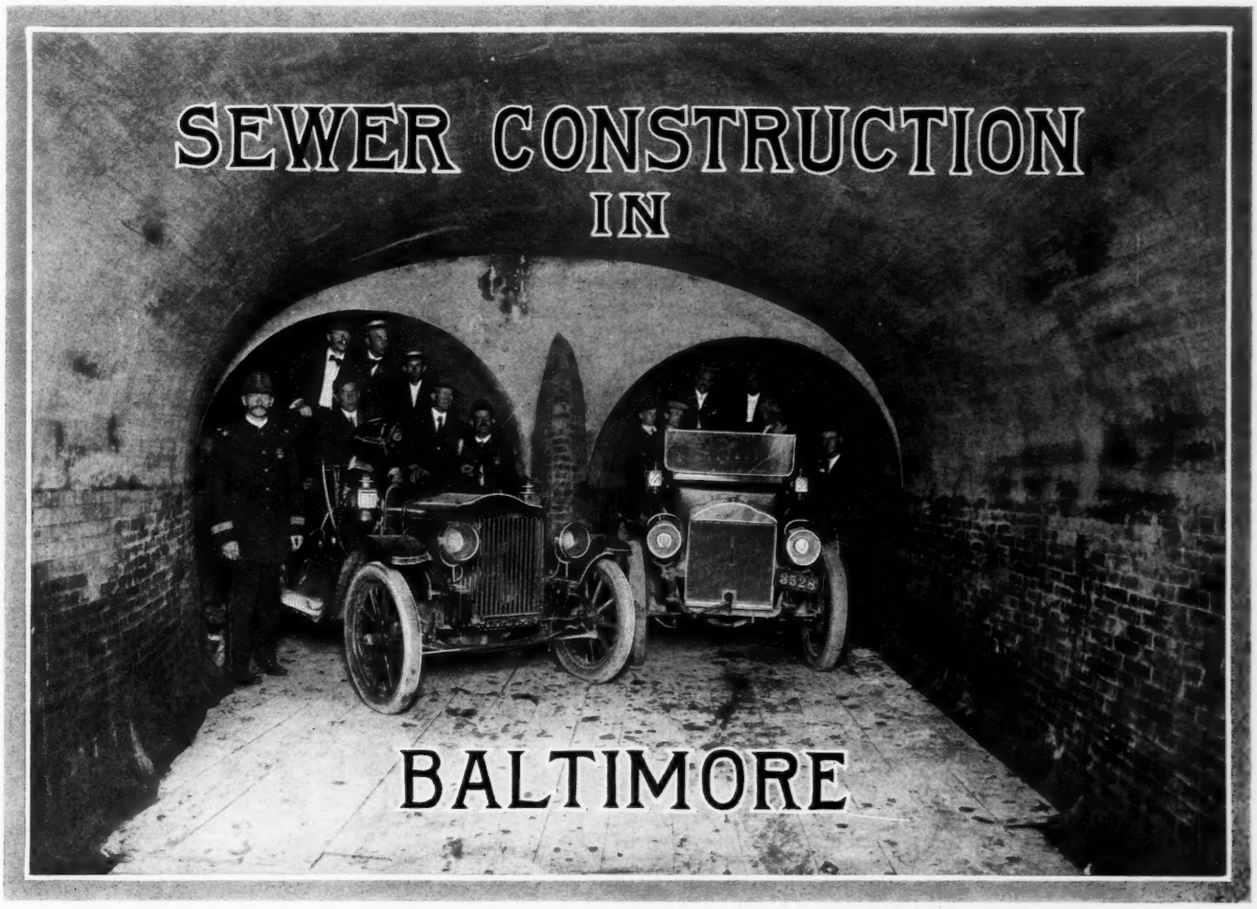


JUNCTION OF OUTFALL SEWER AND TWO INTERCEPTORS

A THOUSAND MILES OF SEWERS

Embraced by Baltimore's System Now Under Construction—From the Worst to the Best Sewered City in the World—Twenty Million Dollars the Total Cost—Largest Vertical Sewage Pumps Ever Made

"SEWERAGE," said Calvin W. Hendrick, Chief Engineer of the Baltimore Sewerage Commission, in a recent address, "is the most serious problem facing the world to-day." This opinion was formed after studying the question both in this country and abroad, and after meeting delegations of business men, engineers and contractors from all parts of the United States, South America, Canada, Mexico, England, Germany, France, Sweden and Japan, who came to inspect the sewerage work now going on in Baltimore. Nowhere was this question more serious, and nowhere is it closer to a solution than in Baltimore. In the words of Mr. Hendrick: "Up to the time the present Sewerage Commission began actual work, the City of Baltimore was known throughout this country and abroad as the worst drained and sewered city of its size in the civilized world. In three years she has climbed from the very bottom of the list half way to the top; and if allowed to continue uninterrupted she will, in three years' time, have climbed to the very top of the list and be the best sewered and drained city of the world." About 400 miles of sanitary sewers and 420 miles additional for house connection; 160 miles of storm water drains and 23 miles of inlet connections are included in the plans under which construction is now being carried on.

Difficulties are no novelty in the prosecution of public work, but in the case of the Baltimore sewerage work, at least two

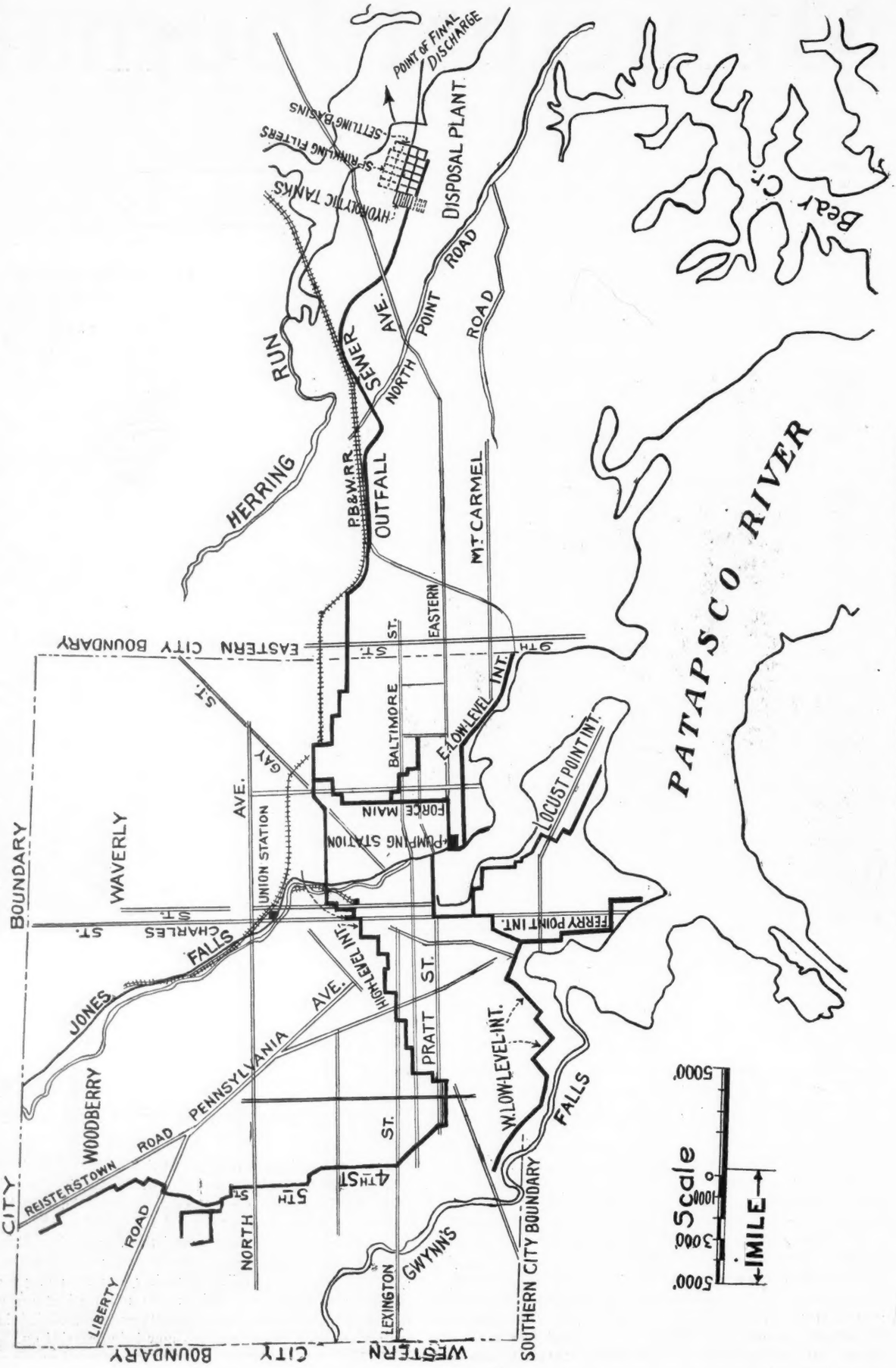


FIG. 1.—MAP OF BALTIMORE, SHOWING INTERCEPTING SEWERS

unusual difficulties had to be overcome. In the first place, the Legislature placed severe requirements on the city, in ordering that every house in the city should be connected with a sewer, and that the final effluent from the system should be of the highest degree of purity which it would be possible to obtain. The purpose of the Legislature was to protect the oyster industry of the Chesapeake Bay, which centers about Baltimore and constitutes a business employing large capital and many men and having great influence. The second difficulty was a physical one, arising from the fact that only a few sewers, and those privately owned, existed in the city. The space in the streets which would ordinarily have been taken possession of by a sewer department were occupied by underground structures placed there by the water and electrical departments and by others, so that the new sewers could not be placed in the best locations without much trouble and expense in avoiding or relocating the older structures. The existence of some 40 miles of old storm water sewers was rather an inconvenience than a benefit, as they could not be made to fit into a complete new system.

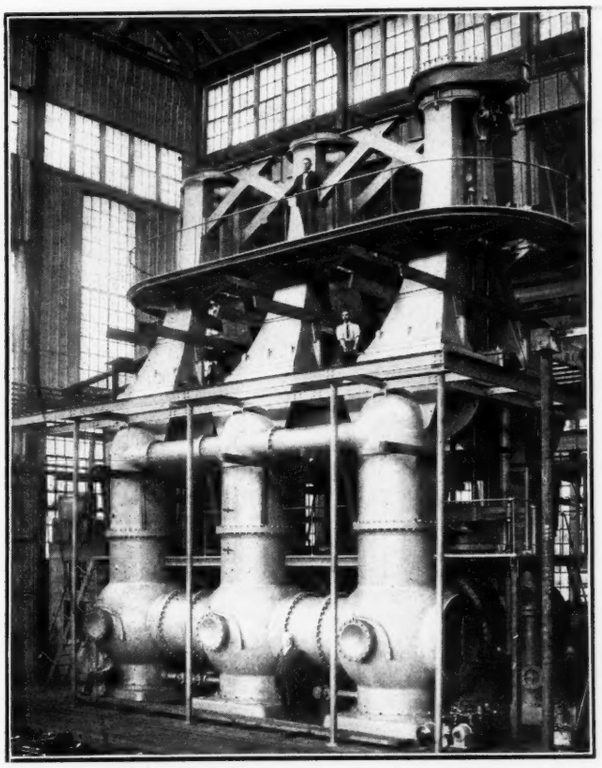


FIG. 2.—ONE OF THE SEWAGE PUMPS ASSEMBLED AT THE WORKS
Steam cylinders not in place because of lack of head room

The general scheme of drainage and sewerage was laid out with reference to the location of the city and the requirements imposed by the Legislature. The city is situated on a more or less semicircular area of low land bordering on the south on a basin or inlet, which is practically an extension of the Chesapeake Bay, and on sand hills 100 feet and more in height surrounding the low territory. The area of the low section is 8 or 10 square miles and the whole area of the city is 30 square miles. Two streams cross the city—Jones Falls, flowing southeast nearly through the center of the city, and Gwynns Falls on the west side of the city, flowing in substantially the same direction. (See Fig. 1.) Hitherto most of the storm water had been led into Jones Falls. This stream had been walled in, but the inlets to many of the storm water sewers were lower than the high water level in the Falls. The result had been serious damage from floods. The general scheme of the revised plan for disposing of storm water is simply to take this water directly into the basin or harbor without the intermediation of the channel of Jones Falls.

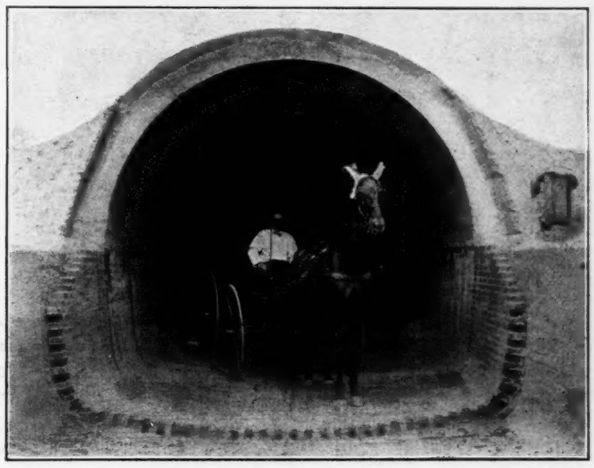


FIG. 3.—END OF COMPLETED OUTFALL SEWER

The main conception of the sanitary sewerage system is equally simple. The seemingly natural outlet for the purified sewage into the basin was rejected because land for a disposal plant would be expensive and the currents carrying the effluent toward the oyster beds were comparatively swift. It was decided, therefore, to carry the sewage north and east by an outfall sewer to a disposal plant on the Back River. To get the sewage to the outfall sewer two systems of intercepting sewers were provided, a high level system taking sewage entirely by gravity from the hill section, where the average elevation is above 80; and a low level system in which the sewage flows by gravity to a pumping station on the water front, where it is forced up to a short interceptor, from which it flows by gravity into the outfall sewer.

A general idea of the present condition of the project may be obtained from a consideration of the estimated cost of the work and the expenditure or appropriations to date. The whole cost of the sanitary sewerage system meeting the full requirements of the Legislature, is estimated at $14,000,000, the cost of the rebuilt storm water system is $4,500,000. Up to the present time contracts have been made, and most of them are approaching completion, for about $7,000,000 worth of work. The plans and present condition of the disposal plant have been described in the MUNICIPAL JOURNAL AND ENGINEER, page 769, of volume XXVII. The outfall sewer was completed in August last. About 7,800 linear feet of high level interceptor and 16,800 feet of low level interceptor (of the latter 5,500 feet on the west and 11,300 on the east of the pumping station) have been completed. The foundations of the pumping station are about all in and work is being prosecuted on the walls, which are waterproofed, and on the brick work and masonry of the screening chambers. Two 42-inch iron force mains from

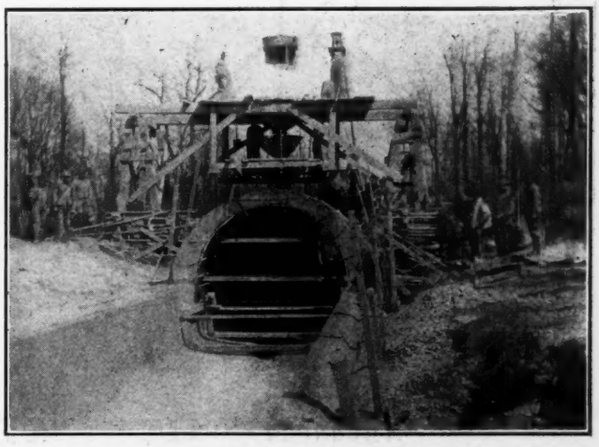


FIG. 5.—HAINS MIXER AND CARSON-LIDGERWOOD CABLEWAY ON OUTFALL SEWER

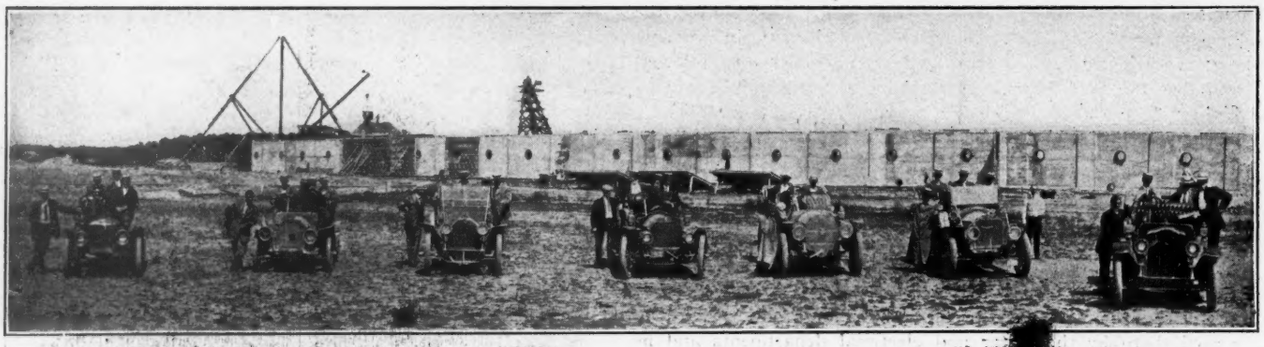


FIG. 4—SIXTEEN AUTOMOBILES CONTAINING PARTY
Wall in background is one side

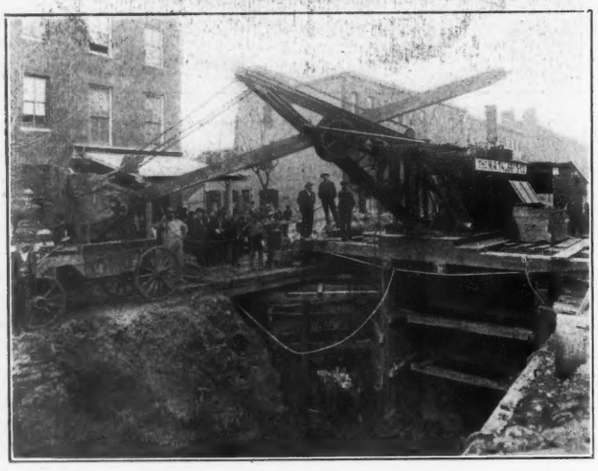


FIG. 6.—VULCAN LITTLE GIANT SHOVEL AT JUNCTION CHAMBER

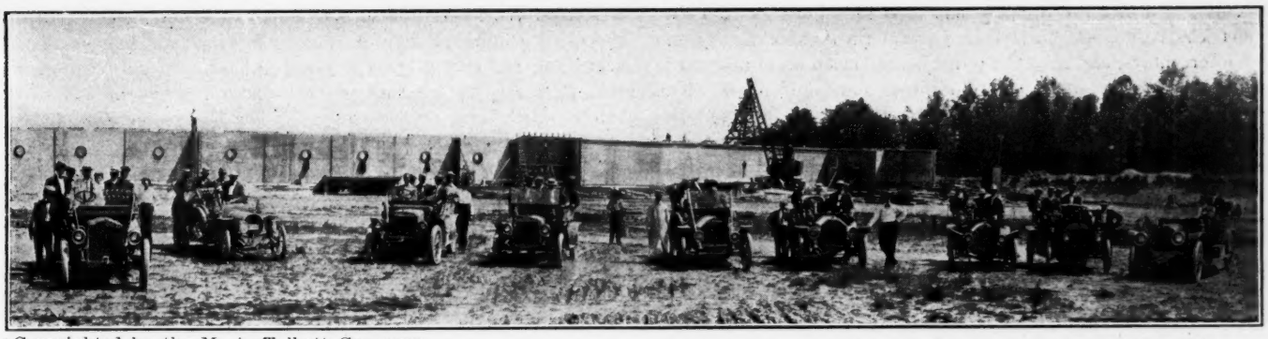
the pumping plant to the interceptor(into which they discharge through an intermediate chamber) have been finished. The pumping engines have been so far completed that two of them have been set up in the shops where they are under construction.

(See Fig. 2.) Several concrete storm water drains of considerable size have been finished and many miles of clay pipe laid. Intercepting sewers and sanitary sewer laterals, for connecting the house drains with the interceptors, have been laid. No house connections will be made until sufficient units of the disposal plant are ready for operation and one or more pumps have been installed.

The outfall sewer (see Fig. 3), which was finished last August, is about 6½ miles long. It is of horseshoe shape, measuring 12 feet 3 inches horizontally and is 11 feet high. It is built of gravel concrete, reinforced with steel, the lower half being lined with hard-burned repressed brick. The concrete shell is 12 inches thick at the top of the arch, increases to 2 feet 2 inches at the spring of the arch, and is 12 inches at the bottom of the invert, the brick lining adding 4 inches to the thickness of the lower half. There is also a 12-inch underdrain. The contracts for constructing this sewer were awarded to several contractors, the M. A. Talbott Company, J. Connelly Construction Company and David Peoples & Company having secured the largest contracts. Nearly all of the work was of the cut and cover type.

The David Peoples Company laid a narrow-gauge track from the Pennsylvania Railroad for the purpose of bringing sand,

FIG. 7.—CARSON-LIDGERWOOD MACHINE ON HIGH LEVEL INTERCEPTOR



Copyrighted by the M. A. Talbott Company.

ABOUT TO RIDE THROUGH SEWERS TO INSPECT THEM
of sprinkling filters

gravel and cement to the line of their work. A Baldwin locomotive and a supply of dirt cars made up the railroad equipment. In excavating they used a Goliath steam shovel. Cableways and Smith and Hains mixers completed their equipment. Most of the work was clay tunnelling. They used Blaw forms throughout.

The M. A. Talbott Company had two long sections of tunnel work in and near the city. This simplified their material problem, as gravel and sand could be delivered along the western end of the work directly from the dealers. They maintained a narrow-gauge road along part of their work. Excavation was done with a Vulcan Little Giant steam shovel. The conditions of the work varied considerably, making different methods of construction desirable at different points, and the work was varied accordingly. A particularly well-ordered section is shown in Fig. 5. Here a Hains mixer is set up directly over the section under construction. The hoppers of the mixer are set up one above the other. A Carson-Lidgerwood cableway delivers the dry materials in a hopper which serves as the bucket and also corresponds to the upper hopper of the Hains mixer. When the section under construction was finished the cableway picked up the mixer and carried it along to its new position. The cableway was also used for excavation and back filling.

The merits of this method were shown in the result, the records for speed in construction having been made in this section. In 190 working days 2,875 linear feet of sewer were built. The amount of concrete required per foot of sewer was about 3 cubic yards, or about 8,600 cubic yards in all. In addition the excavation on this section included 48,000 cubic yards. More or less ordinary teaming was required, and Eagle bottom-dump wagons were used for this.

The illustration forming the frontispiece for this article shows the finished junction chamber, where the two systems of interceptors join the outfall sewer. The illustration, Fig. 6, shows the excavation being made for this junction chamber, at Chase and Durham Streets, preparatory to the concrete work. A Little Giant steam shovel is loading the earth directly into an Eagle wagon. In constructing their sections of the interceptors, the M. A. Talbott Company used a Potter trench machine and also a Carson-Lidgerwood cableway. (See Fig. 7.) The Potter trenching machine is considered as most efficient wherever the contour of the ground and conditions of the work permit its use. The illustration of the two machines, Fig. 8, shows their respective merits and limitations. Work on the high line interceptor in Eager Street had progressed as far as Carroline Street, where a street car line is operated. Here the Carson-Lidgerwood machine was set up and the intersection put in without the interruption of traffic on the car line, which would have been necessary had a Potter machine been used.

Practically the only work on large sewers now being carried on is Section No. 1 of the Jones Falls intercepting sewer. This

FIG. 8.—POTTER MACHINE, AND CABLEWAY CROSSING STREET CAR LINE ON CARROLINE STREET

section, in a distance of less than 1,600 feet, includes four distinct kinds of work, such as is general throughout the system of interceptors, and may therefore be described as in a measure typical of all the work. It also shows some difficulties which are encountered in other places as well. (See Fig. 10.) Beginning at Eager Street the work is of the open cut variety, at first all dirt and further on running into rock, which in a short distance becomes so deep that tunneling is employed. At an alley near Preston Street the rock runs out and the sewer continues as a dirt tunnel. This part of the work might have been done at an equal or less cost in open cut, if it had been possible to secure the surface rights. The sewer has a 75-inch circular section throughout (see Figs. 11 and 12), with certain exceptions to be noted later. The invert is lined with hard-burnt repressed brick—a design typical of the general construction of all the interceptors. The usual underdrain is omitted from this section.

The M. A. Talbott Company, which was awarded the contract which amounts to about $45,000 in value, is using about $11,000 worth of plant. In the open cut a Potter trenching machine is used, with a Lidgerwood hoisting engine supplying the power. The rock in the open cut is sufficiently shattered by the use of 40 per cent dynamite to permit this machine to handle it readily. The rock is a hard trap, and is hauled to a Champion No. 4 portable crusher and screen, operated by a 15 horsepower Farquhar traction engine. The distance is short and the wagons, returning with broken stone, thus haul loads both ways. A ready sale is found for the screenings. The crushed rock used in the concrete shell at this point is the only exception to the general use of gravel concrete. Three shafts are sunk to the tunnel level at Chase, Biddle and Preston Streets, and manholes will be built in these when the construction is completed. A stiff-leg derrick removes the rock from these shafts down to the tunnel level. Near Preston Street is the air compressor plant which supplies all power used on the job, except for the crusher plant and the Lidgerwood engine operating the trenching machine. The air compressor plant consists of two Erie Iron Works compressors, one a single stage portable outfit, the other stationary, double stage. A 4-inch air line supplies seven Ingersoll-Rand drills working in shafts, tunnels and open cut. Lidgerwood hoisting engines operate hoists at the two shafts which have been completed. The boilers were removed from the Lidgerwood plants and, together with a 60-horsepower Erie boiler, supply steam for the compressor plant. A large part of the tunnelling has been completed. When it comes to concreting the tunnel a Hains mixer will be suspended in the middle shaft and deliver the concrete at the bottom of this, and the concrete will be carried to place on a car running on a narrow-gauge track in the tunnel. A Pulsometer pump is used to keep the tunnel dry, considerable water being encountered in places.

The timber roof for the dirt tunnel is being put in place by the segmental method. (See Fig. 13.) A 6 by 8 sill is laid along each side of the excavation as it progresses along the springing line of the sewer, and so as to lie just outside of the sewer shell. As the dirt is removed wooden arches made of sawed pieces of 6 by 6 timber are fitted in place, five pieces of timber forming one arch. From four to six men can excavate and fit in four of these arches at each heading in an eight-hour shift, and work is divided into two shifts of eight hours each. The sticks of timber are carefully sawed according to pattern by a portable contractor's sawing outfit, the Woodpecker, stationed on the surface of the ground. When the arch is completed the excavation is made for the invert. The cost of the timber arch is included in the price of $6 a cubic yard paid for earth excavation.

Following this the concrete invert is constructed. Fifty feet of 83-inch Blaw collapsible forms are used for this purpose, the brick with which the invert is lined later reducing this diameter to 75 inches, the diameter of the sewer. Seventy-five feet of 75-inch Blaw collapsible forms are used for the arch. A short section of this sewer at the north end is open cut work. This is given a flattened section, owing to the requirement of the Pennsylvania Railroad, on whose property it is. (See Fig. 14.)

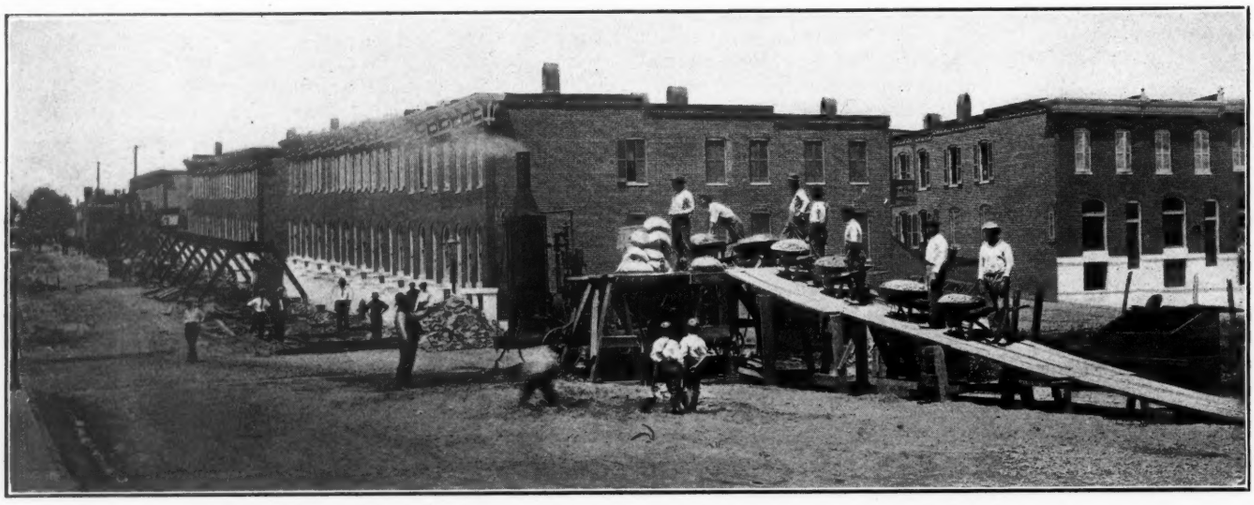


FIG. 9.—MIXING CONCRETE. MOORE TRENCH MACHINE IN THE DISTANCE

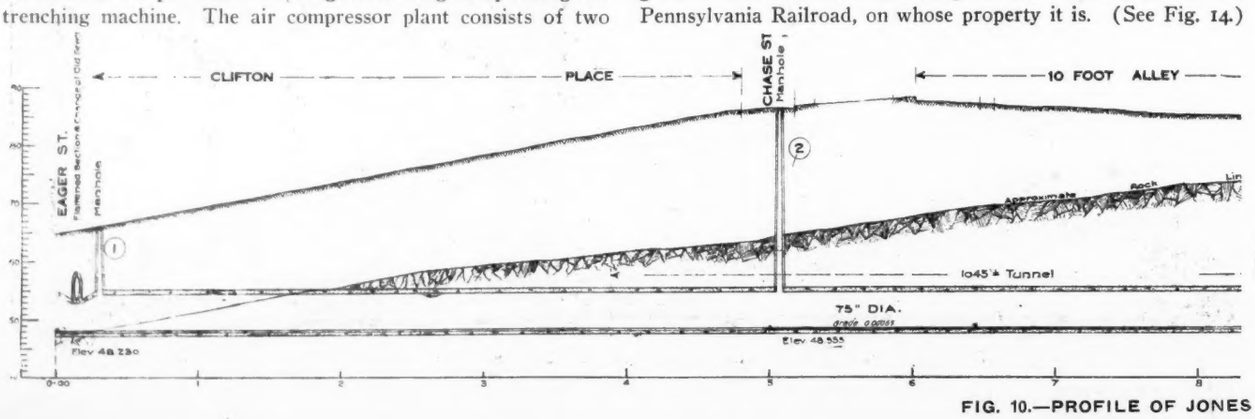


FIG. 10.—PROFILE OF JONES

In the course of future readjustment of tracks entering the new station it is possible that a track may cross the sewer, and that is the contingency being provided for by this flattened section. Accordingly the width of the sewer is increased to 7 feet and the height dropped to 68 inches. The vertical walls are 1 foot 6 inches thick and carry 10-inch, 35-pound I-beams 9 feet 6 inches long, set on 2 feet centers. The bottom is rounded, having arcs of different radii. Most of the sewer in the flattened section has been completed. Owing to the difficulty of bringing concrete material to the ground (the surface is a steep bank), the concrete was mixed by hand.

Interference of old storm drains with the new sewer is shown by the profile to exist at both ends of this work. At the north end a drain is barely avoided, at the south end the sanitary sewer was flattened on the top, as indicated in the plan (Fig. 15).

In the construction of the low-level interceptors, which drain the low portion of the city near the harbor, having an elevation below 80 feet (most of it very much below it), waterproofing has been resorted to in the lowest levels. One such case was the 60-inch interceptor at Light and York Streets, on the west low-level interceptor, which reaches the pumping station at an elevation of 13 feet below tide water. When this sewer is extended as planned it will be necessary to install two lifts. Both the invert and arch were lined with brick, the waterproofing forming an intermediate layer between concrete and brick.

In several instances during the construction of the intercepting sewers large drains have been encountered crossing the line at the same elevation. An instance of this occurs where the high-level interceptor through Chase Street crosses an old storm water drain, 7 feet 5 inches in diameter, in Hopkins Avenue. In another case an 8-foot drain in Wolf Street met the outfall sewer. In both cases the method of overcoming the difficulty was that shown in the illustration, Fig. 16. This method was also used by the Chief Engineer, Calvin W. Hendrick, in New York where drains met the rapid transit subway on the same level. An ordinary inverted siphon is unsatisfactory for two reasons: The variations in flow, and the large amount of dirt that gets into the drains. Fearing neglect in cleaning the grit chambers that would ordinarily be constructed, Mr. Hendrick designed a siphon consisting of three pipes of different sizes. The dry-weather flow keeps the small pipe under constant pressure. During a moderate rain an increase in flow causes the water to rise over a dam and discharge into a second larger pipe. In case of a cloudburst, the surplus water will flow over a second dam into third pipe, the battery of pipes being of sufficient size to take care of a very heavy rainfall over the area drained. As the storm recedes the pipes are put out of commission successively. This device has been severely tested by neglecting to clean the grit chambers and the results have been very satisfactory.

The construction of the force mains from the pumping plant to the force main sewer or interceptor was completed in 1909.

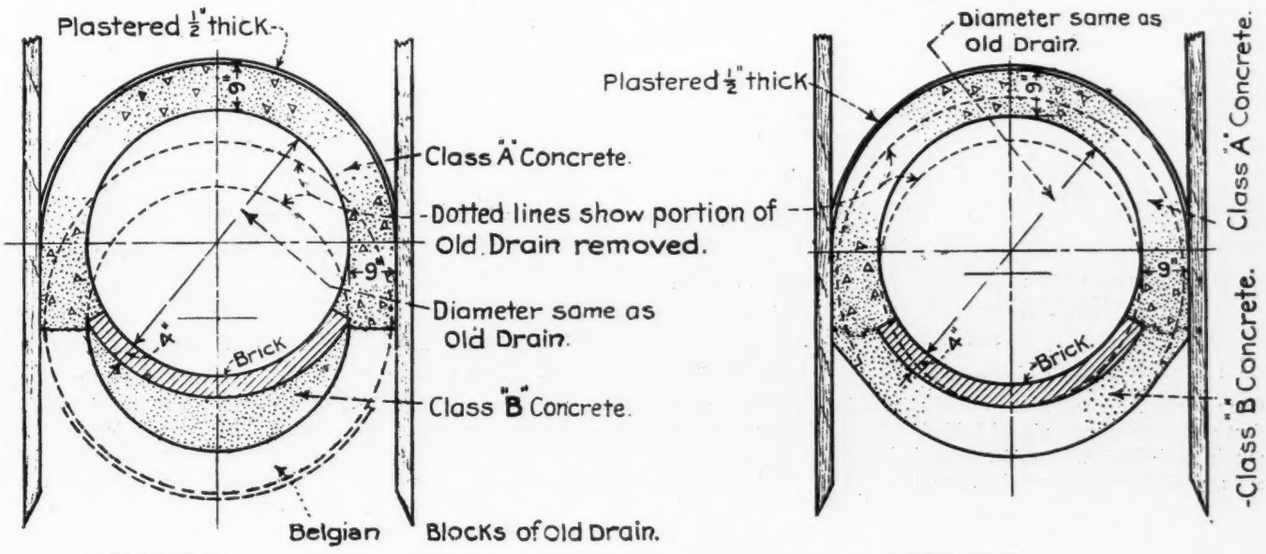
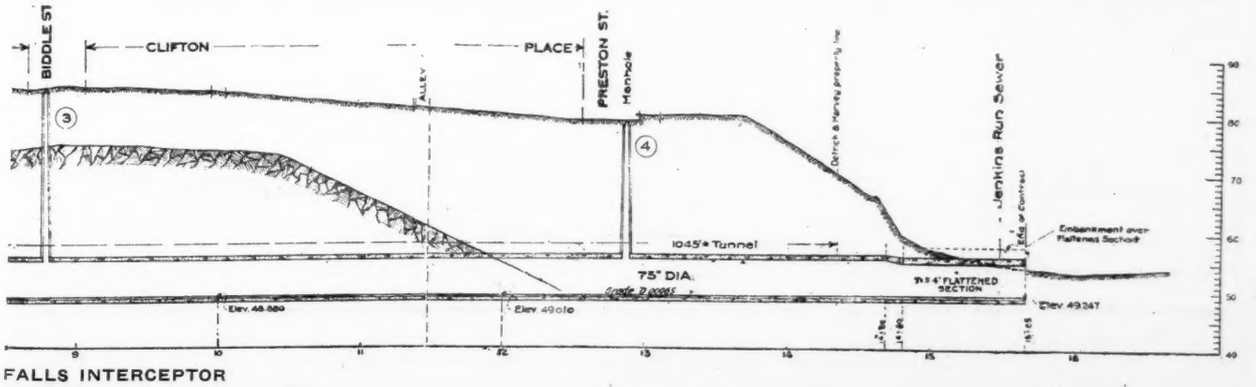


FIG. 11.—SECTIONS OF JONES FALLS INTERCEPTOR. (See Fig. 15.)

Warren P. Brenizer being the contractor. The work was open cut. Two lines of 42-inch cast-iron pipe were laid, the line being about a mile in length. Joints were leaded in the ordinary way. The head pumped against, including friction, is 72 feet. An illustration, Fig. 17, shows the method of lowering the pipe into the trench.

The force main sewer connecting the force main with the outfall sewer is 99 inches in diameter and 4,500 feet long, 660 of which were in earth tunnel. The work was done by Ryan & Reilly, who did remarkably quick work, although using very little machinery. They finished the work 100 days ahead of time, 275 days being allowed for the work. The earth tunnel was done by the leg and cap method. Traveling hoisting derricks were used for excavation. Concrete was mixed by hand. Blaw sectional forms were used in the tunnel work. In using



FALLS INTERCEPTOR

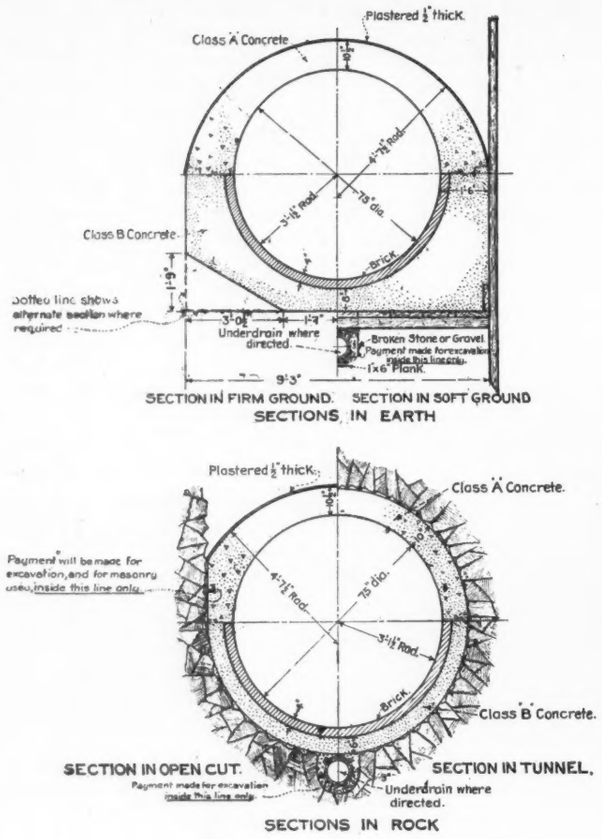

Plastered ½" thick.
Class A Concrete.
Class B Concrete.
Dotted line shows alternate section where required.
Underdrain where directed.
Broken Stone or Gravel
Payment made for excavation inside this line only.
1"x6" Plank.
SECTION IN FIRM GROUND.
SECTION IN SOFT GROUND
SECTIONS IN EARTH
Payment will be made for excavation, and for masonry used, inside this line only.
Brick
SECTION IN OPEN CUT.
SECTION IN TUNNEL.
Payment made for excavation inside this line only.
SECTIONS IN ROCK

FIG. 12.—STANDARD SECTIONS, JONES FALLS INTERCEPTOR

these forms the lower section of the form for the arch is put in first and the concrete placed behind it, then a higher section is put in and filled with concrete and finally the top section is set and the concrete put in from the end as would be done throughout if collapsible forms were used. This work contains two complicated pieces of brick work, one of which is shown in the illustration, Fig. 18. This is the discharge chamber of the force main. There is also a weir chamber where very accurate work had to be done, as the work of the pumps at the pumping plant will be checked by weir measurements at this point. Incidentally it may be mentioned that unusually good brick work is an ordinary feature of the Baltimore system. The character of the workmanship is equal to that generally done on the front wall of a building. There are some cases, as in this discharge chamber, where the work is remarkable.

The pumping station is located on Jones Falls, near the Basin. Here the east and west low-level interceptors deliver their sewage by gravity. The building will cover an area of 24,500 square feet and will be of brick and stone on a heavy concrete foundation. The walls below the main floor will be granite. The slate roof will be carried by steel trusses sup-

FIG. 13.—TUNNELING AT NORTH END OF JONES FALLS INTERCEPTOR

ported by steel columns built into the walls, which trusses will also support a traveling crane. The outside dimensions are 188 feet by 156 feet 7 inches; the height will be about 60 feet. (See Fig. 19.) The coal and ash-handling machinery will extend to a height of 110 feet in a tower. The principal divisions of the building are: Boiler room, engine room and screen chambers. Besides these it contains office and storerooms. The main

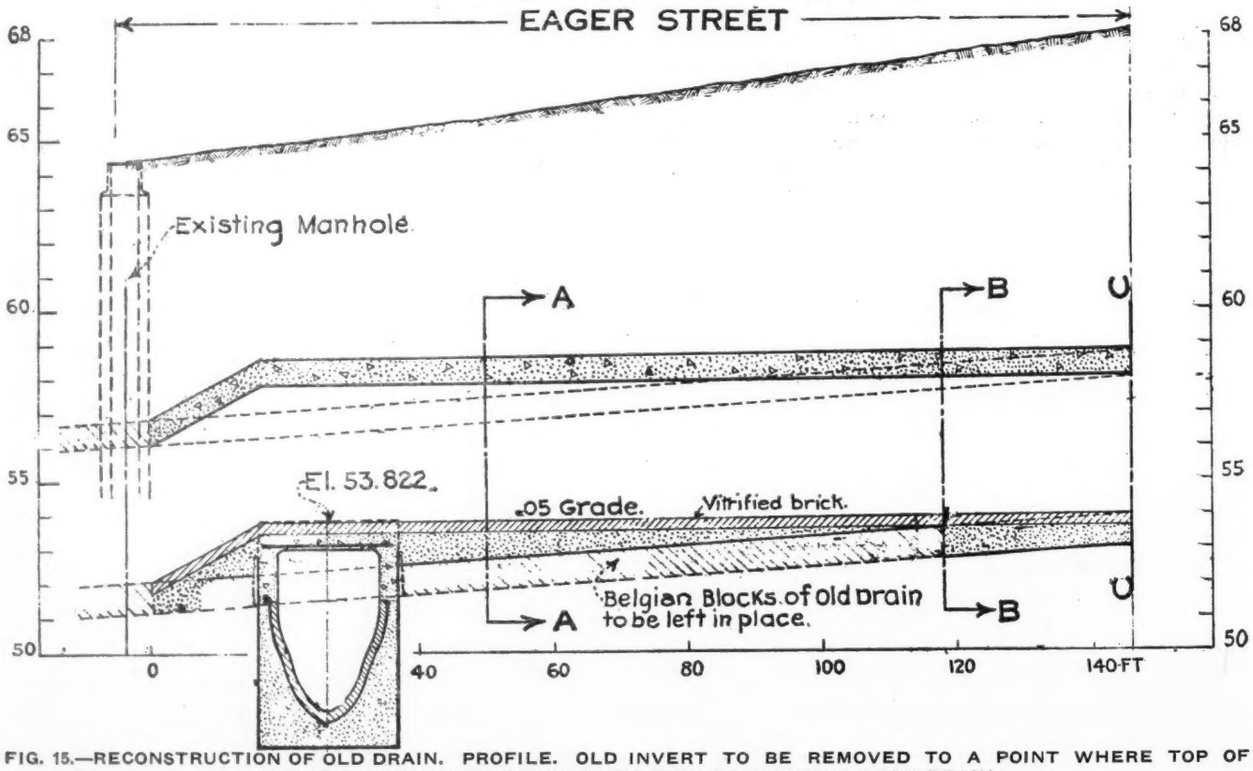


FIG. 15.—RECONSTRUCTION OF OLD DRAIN. PROFILE. OLD INVERT TO BE REMOVED TO A POINT WHERE TOP OF GRANITE BLOCKS IS 5" BELOW ELEVATION OF INVERT OF NEW DRAIN

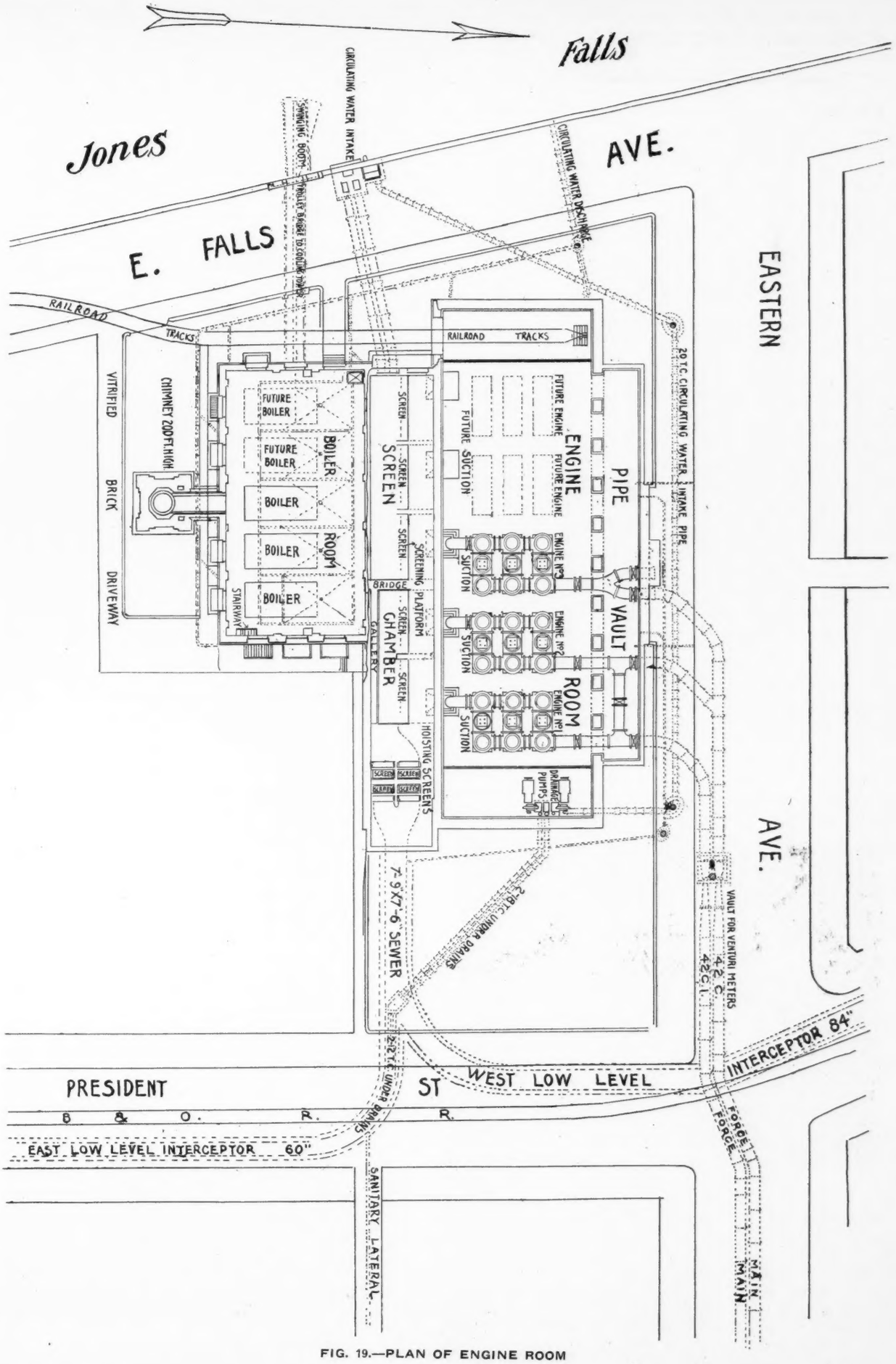


FIG. 19.—PLAN OF ENGINE ROOM

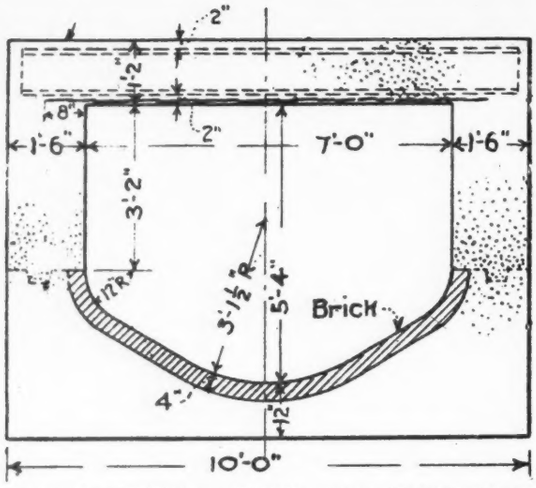


FIG. 14.—FLATTENED SECTION, JONES FALLS INTERCEPTOR

Roof reinforced with wire mesh, 0.15 sq. in. per foot longitudinally, 0.05 sq. in. transversely. Side walls and roof of Class A concrete, base of Class B.

engine room is 180 feet long, 54 feet wide and 68 feet high from basement floor to tie beams on the trusses. Enameled brick work on the walls will extend to a height of 23 feet above the basement floor. The main engine room will contain ultimately five pumping engines, capacity, 27,500,000 gallons in 24 hours; ten drainage pumps; a 20-ton electric crane; electric switchboard, pipes and controlling valves. Three of the pumps are now under construction by the Bethlehem Steel Company, and will be installed first. They will be triple expansion, vertical, crank and flywheel, condensing type, having three cylinders, 22, 41 and 62 inches in diameter, all of 60-inch stroke. Each engine will weigh about 4,000,000 pounds. Working at normal capacity they will have a speed of 20 revolutions per minute, developing 400 horsepower. They are expected to have an efficiency of 150,000,000 on test, and at least 110,000,000 under ordinary working conditions. Three Babcock & Wilcox 260-horsepower boilers will be set as a first installation. Each will be set separately. There will be one economizer with the first installation. The coal bins will have a capacity of 1,200 tons. Each boiler is of sufficient capacity to run one main engine and all auxiliary machinery, and will have a heating surface of 2,600 square feet and a grate area of about 50 square feet. The

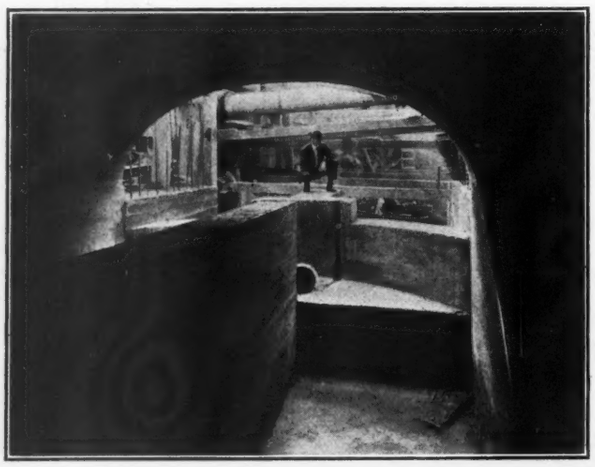


FIG. 16.—UPPER END OF SIPHON UNDER OUTFALL SEWER

steam pressure will be 165 pounds. The economizer will have 1,400 square feet heating surface and will heat feed water from 90 deg. to about 200 deg. Fahr. The stack will be 200 feet high and 6 feet 8 inches in diameter at the top. The concrete foundations are now completed. They were carried down to a bed of gravel about 25 feet below tide water. The walls of the building are approaching street level and are being waterproofed by the Genasco method. Carnegie sheet piling was driven down around the excavation and cut off with an oxy-acetylene burner. Considerable brick work has been done in the screening chambers.

The problem of furnishing concrete materials was an easy one at this point, as scows with gravel and sand were brought alongside of the work and delivered to a Hains concrete mixer by derricks and a locomotive crane. From the mixer the concrete was transported on cars to whatever part of the work it was wanted in.

The arrangements for screening are carefully designed with a view to saving the wearing parts of the pumps as much as possible. The fact was appreciated that a centrifugal pump would have some advantage in this respect, but a single stage pump would hardly have had power enough to work against the head of 80 feet, and a two-stage pump was considered less desirable than a vertical pumping engine. The sewage will accord-

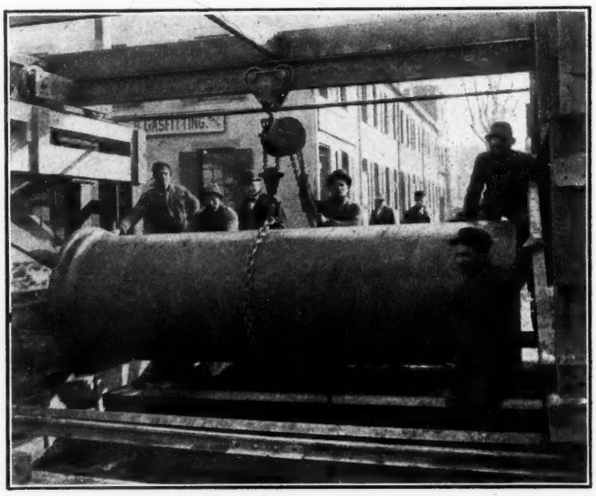


FIG. 17.—LOWERING 42-INCH IRON FORCE MAIN

ingly be screened twice; first near the entrance of the screening chamber, where it will pass through vertical cage screens which will be installed in duplicate, one set to be in use while the other is raised for cleaning; and, again just before entering the pump larger screens of finer mesh will be used. Material collecting on the latter fixed screens will be raked off by hand. Water will be pressed out of the material taken from the screens by steam or hydraulic pressure, and the screenings will then be burned in a furnace in the boiler room basement.

New storm water sewers, as stated, were led into the Basin whenever possible instead of into Jones Falls. That this was not always a simple proposition is illustrated by the fact that three styles of outlets were constructed by David Peoples Company. One of these was a flattened shallow section. A flat wooden form was set to receive the concrete for the top of the drain. Another style was a 48-inch iron pipe outlet, which went to the dock line under water and was set by divers. A third storm sewer was constructed of wooden stave pipe made

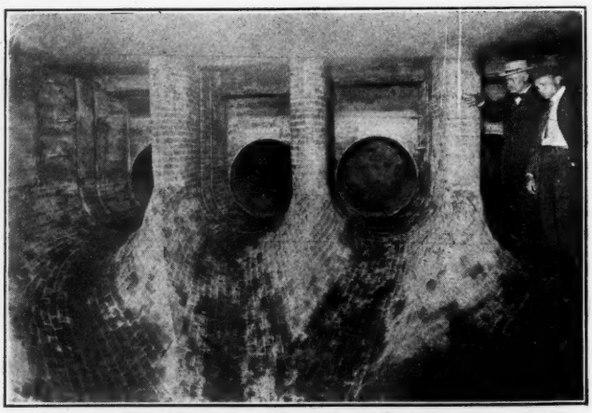


FIG. 18.—DISCHARGE CHAMBER, FOUR PUMPING MAINS INTO INTERCEPTOR

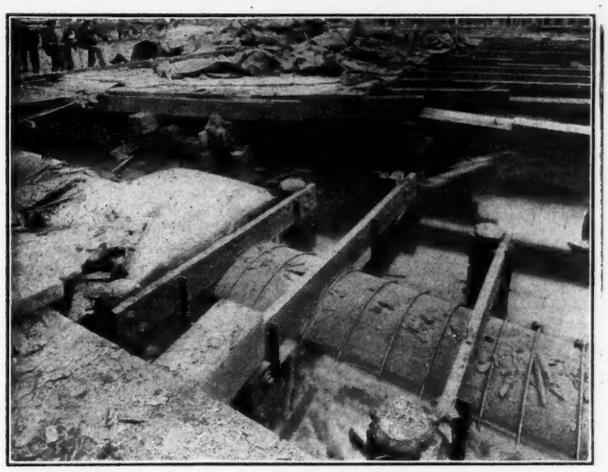


FIG. 22.—WOOD STAVE OUTLET PIPE

by the Baltimore Cooperage Company. (See Fig. 22.) This section is only about 50 feet long and was laid under the new Philadelphia pier of the new dock system. This pipe rests on piling. The photograph shows the junction of the wood with the concrete section of the drain.

Storm water sewers Nos. 5, 7 and 8 were laid by the Wm. McCarthy Company. They were 30-inch to 54-inch concrete, with a brick lining in part of the invert covering one-third of the area of the circle. In connection with their contract, at the upper ends, considerable 12-inch to 24-inch clay pipe was used. This contractor used a Moore trenching machine, and also a Lambert cableway having a 350-foot span. The deepest cut on his work was 24 feet. He used Dunn sewer jacks in connection with his bracing. Concrete was generally mixed with a Smith mixer. On some of his work he used a concrete cart of his own design. It has two large wheels and the body sits about six inches off the ground. Concrete is dumped out of it by bottom doors released by a lever operating on the principle of a bottom-dumping wagon.

The contract for laterals, No. 43, was done by the Wm. McCarthy Company. The pipes are laid from 8 to 15 feet deep. Joints are packed with oakum besides being cemented, in order to keep surface water out of the sanitary system. As a general rule, house connections will not enter directly into the intercepting sewers, but laterals will be laid on the same street, nearer the surface of the ground. They will enter the interceptors by a vertical pipe laid alongside a manhole and secured solidly to it. A good deal of difficulty is experienced in laying laterals on account of obstacles in the form of pipes and conduits near the surface. In order to avoid this, alleys are frequently used. That this method of avoiding difficulties is not always successful is shown in the illustration, Fig. 24. The alley was 10 feet wide, quick sand was encountered and there was a water pipe in the trench. All material had to be wheeled from the end of the alley. The pipe was 10½ feet deep. Under these difficulties only two or three lengths of it could be laid in a day. T. M. Reilly was the unfortunate contractor.

The question of supplying materials for a big piece of work like this is interesting. In connection with it an entirely new business grew up and the operations of the company, the Arun-

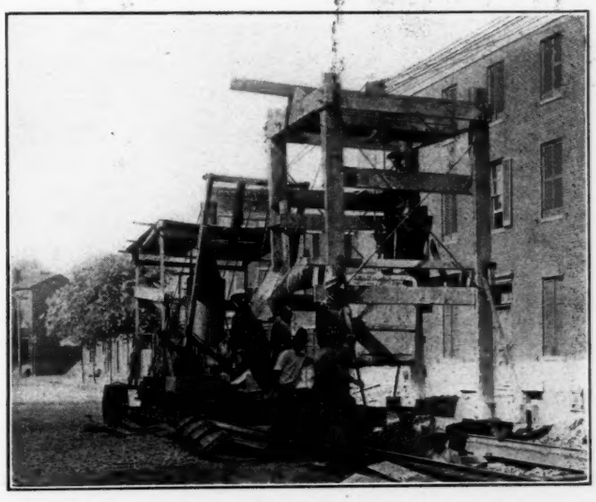


FIG. 23.—LAMBERT TRENCH MACHINE

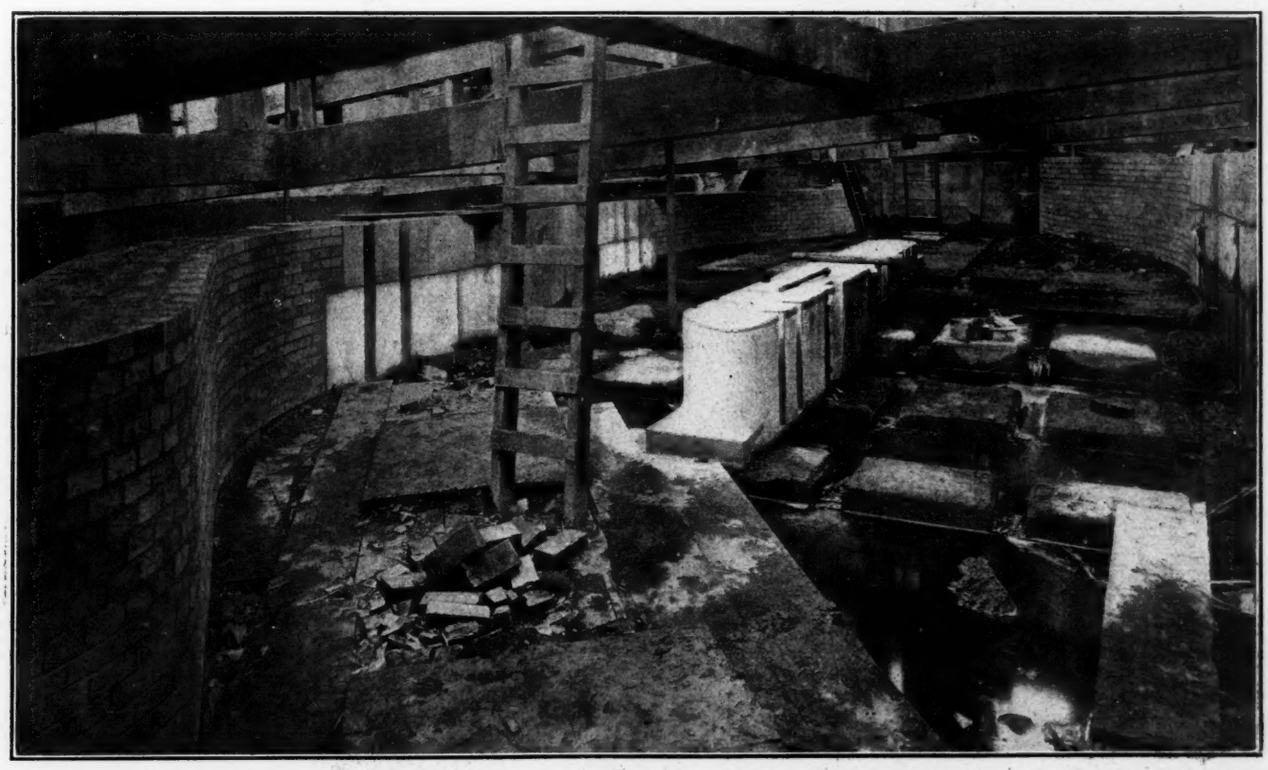


FIG. 20.—SEWAGE PUMPING STATION. VIEW OF MOVABLE SCREEN PORTION OF SCREEN CHAMBER

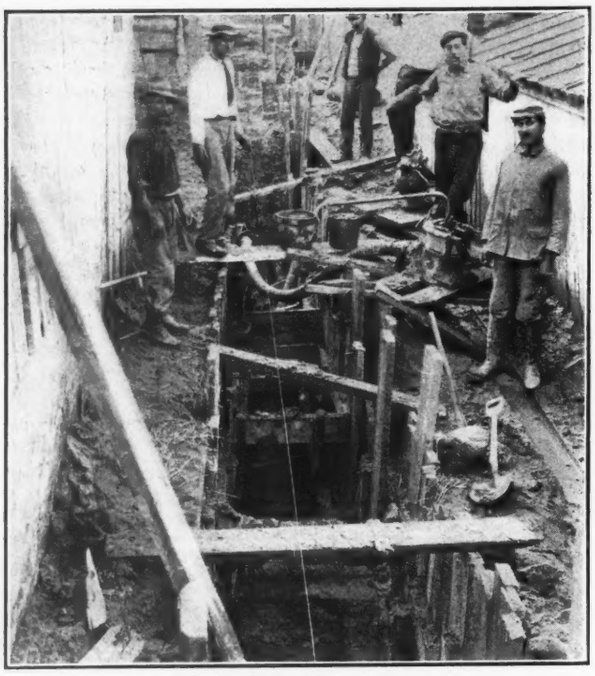


FIG. 24.—SEWER IN TEN-FOOT ALLEY

dell Sand & Gravel Company, have extended to points many hundred miles from Baltimore. This company pumps sand and gravel from the Patapsco River or Chesapeake Bay, screens it, putting sand in one barge and gravel in another, and brings it to the dock, where a remarkable unloading and storing system has been installed. A series of substantial and handsome appearing reinforced-concrete hoppers have been built on a dock, and a traveling crane erected on top of them. The crane unloads the scows, places the material in the hoppers, which are high enough so that wagons can drive under and load quickly.

Brick for lining the sewer are supplied by the Baltimore Brick Company. They are an extra hard-burned, repressed brick, handsome enough to serve as front brick in a high-class dwelling. They pass a test permitting an absorption of not over 4 per cent of water. Various brands of Portland cement have been used—for the most part Alpha, Atlas and Lehigh. Lately a new mill has been furnishing some Security brand.

The magnitude of recent sewer work in New Orleans as well as in Baltimore invites comparison between them. In the former city about 315 miles of sewers have been constructed and about 60 miles remain to be built; as compared with 400 miles in the Baltimore design. The cost of the New Orleans sanitary sewers to date has been a little over $5,000,000, including engineering. For drainage there is in that city over 100 miles of drainage canals, from 25 feet wide down, and 106 miles of 10 to 36-inch pipe, as against 160 miles of storm sewers in the Baltimore plan.

CATCH-BASINS IN CAMBRIDGE

CATCH-BASINS in the city of Cambridge, Mass., apparently receive more careful attention than in many cities. The total number of basins in the city is apparently not definitely known, but 2,742 were cleaned during the year, and as this gives an average of about one to every 225 feet of sewer, either storm or combined, it would seem probable that it approximates the total number. From these catch-basins, during the sixteen months from December to April, 1909, 5,906 loads of sediment were removed at a cost of $8,090.69. The average amount of material removed per catch-basin was 2.15 loads, and the cost of removing this material was $1.81 per cubic yard or $2.92 per catch-basin per year. One thousand four hundred and eighty dollars and sixty nine cents was spent during the sixteen months for flushing sewers and cleaning them by scraping them. This covered the total mileage of 140.34, of which 23.64 miles carried house sewage only, 6.34 were storm sewers and the balance were combined sewers.

FIG. 21.—SEWAGE PUMPING STATION. LAYING BRICK FLOOR OF SCREEN CHAMBER

BROOKLYN'S BUREAU OF SEWERS

Only Municipal Sewer Pipe Testing Laboratory in the Country—Percentage System of Bidding—Cost Data—Rainfall and Run-Off Observations—Cleaning Sewers and Catch Basins

THE sewerage of the Borough of Brooklyn, N. Y., involves probably the most varied collection of structures and methods of any city in the country. The borough includes all classes of districts, from those occupied by the most congested business areas to the new suburbs just reaching out into undeveloped territory. The sewers themselves are constructed of vitrified pipe, cement pipe, concrete, brick, iron and wood stave. The sewage is, to a large extent, discharged into tide water, but that from a considerable number of small areas is treated in several small plants employing different methods of treatment. Owing to the rapid growth of the borough and the failure of the Board of Estimate and Apportionment to act upon applications for sewer extensions with anything like sufficient promptness (they are now a year or two behind in acting upon such applications), the construction of sewers is not keeping pace with the growth of the city. Still, the amount of work done by the Bureau of Sewers each year is enormous.

Fortunately earnest and intelligent work is being done by the engineering department, which, moreover, is not content to do good work along the old lines and in the old ruts, but is endeavoring to excel in the character of the work and introduce improvements wherever possible. One of the means adopted for this purpose is the establishing and use of a testing laboratory for testing the pipes as well as other materials used in sewer construction. In the matter of bidding, the comparatively new Percentage System of bidding has been adopted; and, in connection with this, cost data are being collected and compiled with the intelligence required to make such data of any value. In addition, rainfall and run-off observations have been, and are being, made for the more intelligent calculation of the size of sewers carrying storm water. And in a number of other ways the Bureau is employing such time and money as can be spared from the immediate pressing needs for making improvements and carrying on investigations.

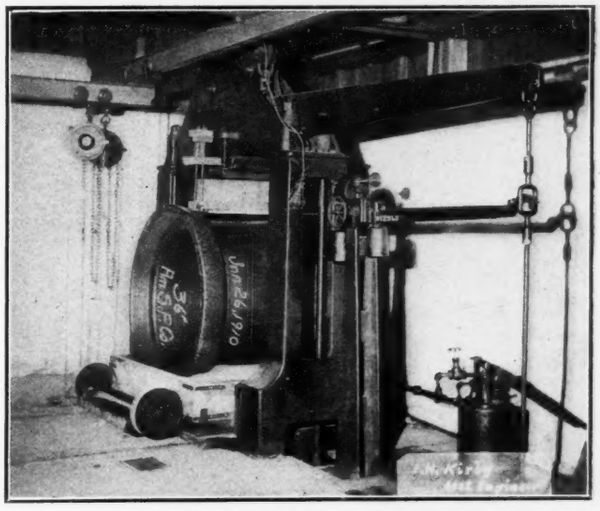
THE TESTING LABORATORY

The Bureau of Sewers of Brooklyn first made tests of sewer pipe in 1905, using for this purpose a compression machine which was described in the MUNICIPAL JOURNAL AND ENGINEER for May 2, 1906. Following upon this, other machines were designed and obtained for regular testing of sewer pipe and installed in a building, which has since been used as a testing laboratory. These went into service in the latter part of 1906 and since that time tests have been conducted regularly on all sewer pipe offered for use by that borough.

The building is a small frame structure which is looked upon as being merely makeshift temporary quarters, as the Bureau hopes to obtain a much more commodious laboratory in the basement of a new municipal building in which the offices of the Department will be located. The present building consists of a basement, or underground room, and a one-story superstructure. In the former is a hydraulic testing machine, and on the main floor is the crushing machine, drop-test machine and other smaller apparatus for drying specimens, making absorption tests, testing cement, etc. Suspended from the roof trusses is a traveling crane which carries chain hoists used for handling heavy pipe.

The hydraulic testing machine consists of a bed plate with a stationary head attached at each end, and also a movable head which can be forced forward from the rear head by a screw working in the latter, which is turned by hand. The pipe to be tested is blocked up on the bed plate with one end separated from the front head by a rubber gasket. The rear head is serted between it and the other end of the sewer pipe, and pressure then applied to the screw sufficient to make watertight joints btween both heads and the sewer pipe. A pipe passing through the stationary head serves to admit water to the interior of the sewer, and when this has been filled pressure is applied by a hand pump and measured by a gauge. This machine is used for determining the pressure required to produce seepage through the pipe and also that necessary to burst it. Besides being fastened to the bed plate, the two stationary heads are tied together by rods, the distance between which limits the size of the pipe which can be tested to about 24 inches. This machine is not used regularly, but only for special tests, as vitrified pipe is used almost wholly for pipe sewers and none has been found which is not sufficiently impervious.

The crushing machine is a Riehle testing machine having a capacity of 75,000 pounds. Pressure is applied by hand by means of an oil pump. After experimenting with other methods of supporting the pipe, including resting it upon two longi-



COMPRESSION TESTING MACHINE.

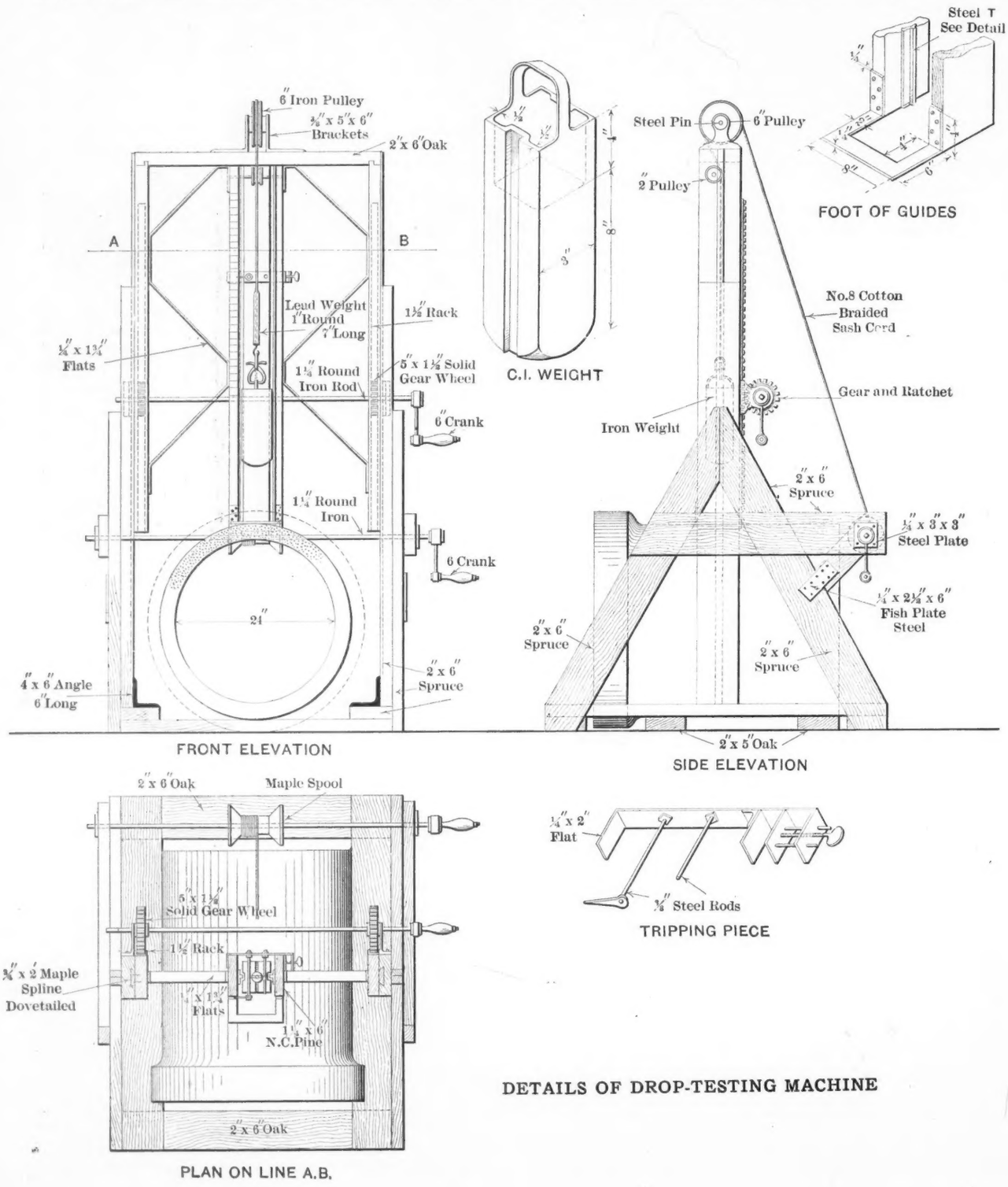
tudinal strips or so called "knife edges," the only practical method appears to be bedding the pipe in sand in a stout box and applying downward pressure on the top of the pipe. Pressure is applied in some cases only up to the requirement of the specifications, in others until the pipe breaks. This it invariably does at four points: the top, bottom and the two sides half way between these. In the case of egg-shaped sewers standing in their natural position, the side cracks occur almost exactly at the springing line. The machine used is sufficiently large between uprights to take a 42-inch pipe.

For supplying the pressure there is attached to the under side of a heavy horizontal plate at the top of the machine a strip of hardwood one inch square in cross-section and 3 feet long. The pipe to be tested is placed in the bottom of the machine, so adjusted in its sand bed in a small car that when the plunger raises the car and pipe, the strip of hardwood will rest along the exact top of the pipe. In order to apply the pressure uniformly over the entire length of the pipe from spigot end to just back of the bell, a strip of plaster of paris about ½ inch thick and one inch wide is placed directly under the wooden knife edge. For placing this a sort of mold is made of two strips held together by small bolts and thumb nuts, which strips are laid on top of the pipe and drawn together by the thumb nuts in such position that the wooden knife edge when lowered will just fit between them. The space between them is then filled with plaster of paris to a depth of about ½ inch and the knife edge lowered onto the plaster of paris and light pressure applied so as to thoroughly compact this, bring it to a bearing with the sewer pipe throughout and give

a top surface which will receive uniform pressure from the knife edge. When this plaster of paris has set, the side strips are removed and the pipe is then ready for testing.

The drop test is made by a simple home-made machine consisting of two upright posts each fastened and braced to a sill, between which posts a gallows frame plays vertically, being raised and lowered by rack and pinion on each leg of the frame. This gallows frame carries two wooden guides similar to the hammer guides of a pile driver. Between these guides a weight plays, each guide having a tongue fitting into a groove in one side of the weight; the whole in this respect also representing an ordinary pile driver. To the guides a simple wrought-iron contrivance which acts as a trip to the hammer clutch can be fastened at any desired position. The cord which lifts the hammer carries at the bottom an ice-tong clutch, which releases the hammer when its upper ends are pressed together by the tripping contrivance. A lead weight is attached just above the clutch to lower the cord and clutch after the hammer has fallen and the cord is released. In fact, it will be recognized that the entire contrivance is merely an ordinary pile driver in miniature. The hammer is of iron, its bottom face being rounded to the radius of a 10-pound iron ball, and the specifications provide for using such a ball, dropped by hand, for a field test.

As just stated, the tripping contrivance can be attached at any point and thus regulate the height of fall, the maximum



DETAILS OF DROP-TESTING MACHINE

height being about 24 inches. In making a test the entire gallows frame is raised out of the way by the racks and pinions, the pipe to be tested is placed and blocked in position so that its highest point at about mid-length will come under the hammer, and the gallows frame is then lowered until the hammer guides touch the top of the pipe. The trip having been set at the desired height, the hammer is raised by winding up the cord on a small drum or spool, the hammer is released and falls freely upon the pipe. This is repeated until a hole is broken through the pipe, the number of blows being counted and recorded. This apparatus can take a pipe of any size up to 24 inches diameter. The hammer frequently punches an approximately round hole through the shell with very little splintering on the top surface, although the under surface spalls off for an area of two or three times the diameter of the hole; but in the majority of cases the pipes are totally destroyed.

In the drop tests for 1908 different weights of ball and heights of drop were employed. Taking the results from those tests only which employed a 10-pound ball with an 18-inch drop, we find the following results: 18-inch vitrified pipe, first crack appeared after from 2 to 98 blows, the average being 26; total failure occurred after from 4 to 200 blows, the average being 54.4. 15-inch pipe, first crack appeared after from 6 to 7 blows, the average being 6½; total failure occurred after from 9 to 15 blows, the average being 12. 12-inch pipe, first crack appeared after from 2 to 4 blows, the average being 3¼; total failure occurred after from 6 to 14 blows, the average being 8½. 6-inch pipe, first crack appeared after one blow in each case; total failure occurred after either one or two blows, the average being 1½.

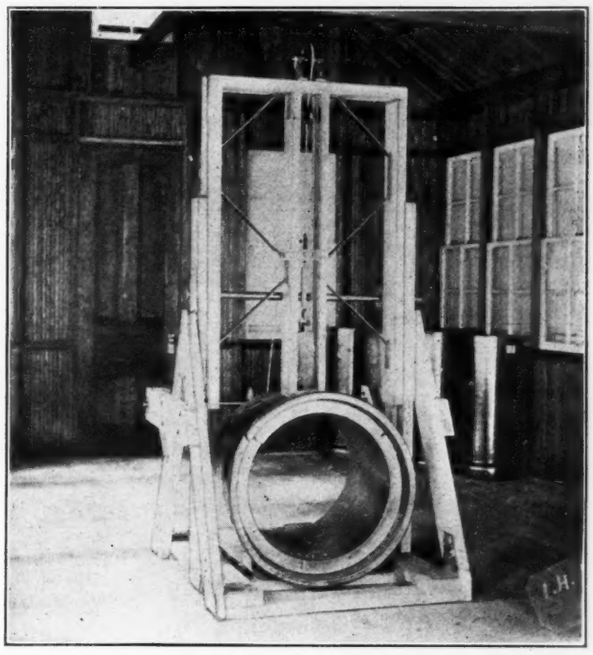
The laboratory is in charge of Assistant Engineer I. H. Kirby, who devotes a part of his time only to this work. Three laborers, however, are employed here continuously as well as one engineer with the title of rodman. Samples of vitrified clay pipe used on contract work have been tested in this laboratory for three years past, and, in addition, tests have been made of pipe proposed for use, but of a style not yet accepted, this including two or three kinds of reinforced-concrete pipe.

We believe this is the only municipal testing laboratory in the country arranged for the regular testing of sewer pipe. It is to be hoped that other cities will provide such laboratories in the near future, however, and that standard specifications may be agreed upon and standard methods of conducting tests. A committee of the Society for Testing Materials has been collecting data upon this subject for two or three years past and there seems to be now some prospect of definite results, to be embodied in a report which may be ready within the next few months.

There would seem to be undoubted value in testing pipe if one can judge by the character of vitrified pipe which is now being furnished to the Borough of Brooklyn, for we believe we have never seen such uniformly excellent pipe as those now being used there.

During 1909 a number of 42-inch vitrified clay pipes were tested. Manufacturers have in the past found considerable difficulty in furnishing pipe of this size which was satisfactory in all respects, the weight of the pipe making it difficult to handle the same before burning without distorting it, and the thickness of the shell making thorough and uniform burning difficult. Chief Engineer Fort found that pipes of this size tested last year were all "perfect specimens, not only as regards general dimensions, but in character of material used, glazing, burning, etc. The strength developed under the usual crushing test greatly exceeded expectations. From the results of these tests and the general excellent character of the pipe I am confident that in the first contract in which these large sizes are used, it will be demonstrated that where it is essential that the sewer should be water-tight and the inflow of ground water is large and under considerable head, the use of pipe of this character, permitting the completion of the sewer section at one operation and avoiding the necessity of great care in making a multitude of water-tight joints, is economical and produces better results, even though the first cost of such pipe is high."

Although some cement and concrete pipes were tested last year, no cement pipe has been laid for a number of years past, the manufacturers failing to furnish pipe which meets the requirements of the specifications, which requirements are considered desirable by the Engineering Department and are met by the vitrified pipe which is used. One of the principal objections is to the form of the bell, no cement pipe having been



DROP-TESTING MACHINE, BROOKLYN SEWER BUREAU

furnished which permits of making a tight joint, and to the porosity of the pipe, infiltration of ground water being considered a serious objection. Concerning this Mr. Fort says:

> This will hereafter be a much more important matter in this borough than heretofore, because the design of sewers for the suburban wards, where elevations are slight and many sewers will be laid below the level of ground water, calls for a separate system; that is, domestic sewage will be carried in sewers from which storm water will be excluded. This sewage must, under such conditions, be pumped, and any inflow of ground water would add greatly to the annual expense therefor. Percolation out of the sewer seldom takes place to any extent for any length of time, and is of little consequence. Percolation through vitrified pipe, such as is used in this borough, usually commences at a pressure of five pounds per inch, equivalent to a head of water of 11.5 feet. It increases very slowly as the pressure increases to the point of bursting, which is usually at above 40 pounds per square inch. Percolation through the cement pipe laid in this borough

Showing Results of Absorption Tests on Sewer Pipe During the Year 1907

Size and Kind of Pipe.	No. of Tests.	Average Weight of Sample after 24 Hours at 212° Fahrenheit Grams.	Average Increase of Sample after 7 Days in Water. Grams.	Average Per Cent Increase.	High Per Cent Increase.	Low Per Cent Increase.
6-inch vitrified..	31	859.55	33.58	3.91	6.99	1.79
6-inch fire clay..	3	533.47	24.43	4.58	5.84	3.92
6-inch cement...	2	1,374.07	89.55	6.52	6.62	6.38
9-inch fire clay..	9	897.84	30.25	3.37	4.13	2.92
10-inch vitrified..	1	875.00	23.30	2.66	2.66	2.66
10-inch fire clay..	1	517.50	17.10	3.30	3.30	3.30
12-inch vitrified..	324	1,011.31	41.12	4.07	7.08	1.42
12-inch fire clay..	7	580.40	26.17	4.51	5.41	3.23
12-inch cement...	5	1,348.12	90.13	6.69	7.59	6.02
15-inch vitrified..	128	1,151.46	42.92	3.73	6.01	1.30
15-inch fire clay..	7	748.56	38.66	5.17	5.71	4.32
15-inch cement...	4	1,553.11	115.85	7.46	9.36	6.02
18-inch vitrified..	68	1,659.03	59.08	3.57	5.86	1.64
18-inch fire clay..	1	2,774.80	107.90	3.89	3.89	3.89
18-inch cement...	3	1,813.00	119.17	6.57	6.97	5.19
24-inch vitrified..	32	1,466.68	53.46	3.64	6.05	2.00
24-inch cement...	4	2,116.89	142.54	6.73	8.11	5.37

Averages—Vitrified pipe, 584 tests, average per cent increase in weight, 3.90.
Fire clay pipe, 28 tests, average per cent increase in weight, 4.25.
Cement pipe, 18 tests, average per cent increase in weight, 6.83.

CRUSHING STRENGTH OF SEWER PIPE

RESULTS OF EXTERNAL CRUSHING TESTS ON SEWER PIPE DURING THE YEAR 1909

SIZE.	Total Number Tested.	Number Tested to Required Pressure Without Breaking.	Number Tested to Destruction.	Average Pressure, Pounds per Linear Foot of Pipe.	Highest Result, Pounds per Linear Foot of Pipe.	Lowest Result, Pounds per Linear Foot of Pipe.	Number of Failures.	Percentage of Failures.	Number Passed Test.	Percentage Passed.	Required Pressure, Pounds per Linear Foot.
6-inch	170	0	169	1,537	2,333	1,033	0	0	170	100.00	1,000
12-inch	245	0	245	1,542	2,900	933	5	2.04	240	97.96	1,150
15-inch	72	0	72	1,935	2,800	1,300	0	0	72	100.00	1,300
18-inch	25	0	25	2,389	3,100	1,734	0	0	25	100.00	1,450
24-inch	17	3	14	2.825	3,800	2,200	0	0	17	100.00	2,000
30-inch	2	standard 0	2	3,260	3,280	3,240	0	0	2	100.00	.....
30-inch	2	double strength 0	2	3,160	3,240	3,080	0	0	2	100.00	.....

NOTE.—Above tests were made as described in article. Tests made in 1908 and 1907 were made with pipe buried in sand in such a manner that sand extended for 8 inches over and above the outer surface of the top and under the outer surface of the bottom, and a distance on each side equal to one third of the internal diameter of the pipe. It was assumed that the pressure applied is uniformly distributed and that portion of it which lies within the vertical projection of the pipe is borne by it. Since then the method described in the body of this article has been substituted as affording a more reliable standard.

RESULTS OF EXTERNAL CRUSHING TESTS ON SEWER PIPE DURING THE YEAR 1908

SIZE.	Total Number Tested.	Number Tested to Required Pressure Without Breaking.	Number Tested to Destruction.	Average Pressure, Pounds per Linear Foot of Pipe.	Highest Result, Pounds per Linear Foot of Pipe.	Lowest Result, Pounds per Linear Foot of Pipe.	Number of Failures.	Percentage of Failures.	Number Passed Test.	Percentage Passed.	Required Pressure, Pounds per Linear Foot.
6-inch	161	131	30	4,477	6,627	2,714	2	1.24	159	98.76	3,000
12-inch	204	162	42	4,928	6,723	3,548	0	0	204	100.00	3,000
15-inch	51	22	29	4,741	6,522	3,849	8	15.68	43	84.32	4,500
18-inch	18	15	3	8,386	10,451	6,951	0	0	18	100.00	4,500
24-inch	7	6	1	10,898	10,898	10,898	0	0	7	100.00	.....
				CRUSHING TESTS ON KOSMOCRETE PIPE.							
15-inch	2	1	1	4,094	4,094	4,094	1	50	1	50.00	4,500

RESULTS OF EXTERNAL CRUSHING TESTS ON SEWER PIPE DURING THE YEAR 1907

SIZE.	Total Number Tested.	Number Tested to Required Pressure Without Breaking.	Number Tested to Destruction.	Average Pressure, Pounds per Linear Foot of Pipe.	Highest Result, Pounds per Linear Foot of Pipe.	Lowest Result, Pounds per Linear Foot of Pipe.	Number of Failures.	Percentage of Failures.	Number Passed Test.	Percentage Passed.	Required Pressure, Pounds per Linear Foot.
6-inch	417	291	126	4,275.51	7,167	2,128	12	2.86	405	97.14	.....
9-inch	7	4	3	3,983.00	4,845	2,852	1	14.29	6	85.71	.....
10-inch	4	3	1	5,593.00	5,593	5,593	..	....	4	100.00	.....
12-inch	433	299	134	4,696.05	7,144	2,244	4	0.92	429	99.08	.....
15-inch	125	68	57	5,045.80	6,755	3,218	16	12.80	109	87.20	.....
18-inch	91	52	39	6,311.20	12,211	3,230	8	8.79	83	91.21	.....
24-inch	34	24	10	9,866.30	14,239	7,780	..	....	34	100.00	.....
Total	1,111	741	370	.....	.....	.....	41	3.69	1,070	96.31	.....

commences with a very light pressure, and becomes very considerable as the pressure increases to five pounds per square inch."

Percolation through a 12-inch cement pipe under a head of 4 feet has been found to amount to about 20,000 gallons per mile per day; and with other sizes and heads the percolation would be in proportion.

In addition to these objections, the Engineering Department reports that it is fully persuaded that cement pipe should not be used wherever any acid would reach it, no matter how weak; as they have found that the invert of such pipe is almost sure to be destroyed under such conditions. In several places throughout the city it has been found necessary to replace cement pipe with vitrified clay or brick sewer, and in practically every instance this has been where the effluent from a brewery, a dye works, or some other manufacturing industry reaches the sewer, which effluent contains spent liquors or wash water containing weak acids. (In the case of the breweries a highly diluted acid is used for washing returned bottles.) The engineers state that, in their opinion, a sewage sufficiently acid to give a reaction to litmus paper will be almost sure to attack a cement pipe. Wherever it has been laid near factories producing acid wastes its invert has disintegrated entirely and it has been replaced with vitrified pipe.

Percentage System of Bidding

About the beginning of 1907 the percentage system of bidding was adopted by the Bureau of Sewers of Brooklyn Borough and has been used for most contract work since that time. This system of bidding had previously been used by a few cities, but its use has not become at all general. Under this system the engineer prepares an estimate of the cost of the work to be bid upon, assigning a quantity to each item and also a price. The total cost of each item and that of the entire work are then calculated. This estimate in detail is furnished to each contractor desiring to bid and his proposition includes, not a bid upon each item, but merely a statement of the percentage of the engineer's prices for which he is willing to do the work; the same percentage to apply to all items. "It is the aim, of course, in preparing the estimate to give the actual cost of the work plus a reasonable profit to the contractor. When the bids of various contractors vary widely, as is always the case, it is, of course, impossible for the engineer's estimate to agree closely with these bids, or even with the lowest bid submitted. It is not essential to the success of the system, and it is not expected that they will agree closely. It is essential that the prices contained in the estimate should be well balanced and the percentage of error in them should be fairly constant." The chief object of the system is to prevent unbalanced bidding, and it is therefore especially incumbent on the engineer that his own bid should not be unbalanced.

During 1907 twenty-four contracts were let on this basis, and during 1909 the system was used in all except a few cases where it was considered advisable to ask for a lump sum bid or where the work was of an unusual character and unit prices could not be estimated accurately enough to insure a balanced estimate. In his 1909 report, Chief Engineer E. J. Fort discusses this subject as follows:

The results obtained have been generally satisfactory so far as the city's interest is concerned in broadening competition, in maintaining prices at a reasonable or low figure, and in avoiding unbalanced bids and the consequent use of outside influence in overruling the engineer in his plain duty in carrying out contracts according to their letter and spirit. I do not mean to assert that the system is without fault, for it undoubtedly has a number of faults, and from the contractor's point of view sometimes seems

to be unfair. The arguments advanced against its use by contractors (who are quite generally opposed to it), and which undoubtedly have some foundation in fact, are as follows:

(1) That it is too easy for those not familiar with this class of work and the particular conditions in each case to submit bids. The detailed estimate of cost given makes public certain information which is a part of the experienced contractor's stock in trade, which he has taken time and money to acquire, and which in all fairness he is entitled to the benefits of. The best of reasons must be advanced for not awarding contracts to the lowest bidders. It is a popular notion that there is much profit in any kind of municipal contracts. The result is that many contracts under this system of bidding are awarded to incompetent men, that the quality of the work is not the best, and that profits are a minus quantity. In many cases complications and delays which arise leave the city a loser, even though prices bid are very low.

(2) An incompetent engineer is not capable of preparing sufficiently correct estimates, and the way is open for an unprincipled or a dishonest one to enter into collusion with contractors to defraud the city by the preparation of unbalanced estimates.

(3) That as a general thing engineers are not as capable of estimating accurately the cost of a piece of work as contractors.

(4) That this system is peculiar to one borough or district of the city government, whereas the system of bidding should be uniform throughout the different city departments, so that any contractor may submit bids for work in any part of the city with the assurance that conditions to be met are everywhere the same.

The committee appointed by the Board of Estimate and Apportionment to consider the feasibility of standard specifications for contract work under the jurisdiction of the Borough President has only commenced this work. It has held only one meeting and one public hearing, at which contractors and others interested were invited to appear and make such representations and suggestions as they desire. A representative of the General Contractors' Association and a number of individual contractors appeared at this hearing and requested a number of changes in the present specifications. They were invited to submit briefs on the subject and have since done so. No action has yet been taken on these briefs or on the general proposition.

The position of the General Contractors' Association in relation to this matter was stated as follows:

"We would ask that the percentage system of bidding on work be abolished for the following reasons:

"It does not insure an unbalanced bid unless it could be assumed that the estimate of quantities as made up by the engineer, together with his estimated cost, were absolute and accurate. We feel that a contractor of experience is better enabled to estimate the cost of work than the engineer, whose ideas of cost must be largely a matter of conjecture. It would permit of irregularity in unbalancing the estimated quantities by the engineer preparing the estimate (should he be unscrupulous) and enable him to work in collusion with a favored bidder. By the ordinary system of bidding, item by item, it is possible, where such a condition of unbalanced quantities exist, to so arrange the prices on the various items, reducing that on an overbalanced item and increasing the price on some other item which will cover it in accordance with the original quantities, as to reimburse the bidder for the loss which he will sustain on the overbalanced item. With the percentage system, however, the bidder has no opportunity along that line, as his average percentage price is applied uniformly to the engineer's 100 per cent. standard, and if that standard be too low or too high in any particular item or items, the bidder has no recourse but to follow the ratio designated by the engineer and must make his percentage sufficiently high to safeguard himself, which course makes his bid higher than it would be were the quantities properly stated by the engineer. It is claimed that the percentage system of bidding prevents unbalancing by the contractor; but it would seem possible for the engineer to detect an unbalanced bid quite as readily by the system of item bidding, as he could apply his uniform standard in comparison with the contractor's scale of prices and satisfy himself whether the latter were unbalanced.

"The fact that the engineer has established the 100 per cent. basis for bidding might be assumed by the uninformed as implying that such standard was sufficient and that prices should never exceed the engineer's limit. We submit that the engineer is not in a position to make the careful estimate of cost that the contractor must make in submitting his bid for the work. The engineer is apt to assume that certain fixed standards will meet all conditions, which is not true in all cases, and may result in an unbalanced estimate as the standard. The contractor, in estimating a piece of work, would figure item by item, and compare his total cost with the engineer's 100 per cent. allowance, regardless of the fact that his scale of cost may not correspond in ratio in every respect with those given by the engineer. It is impossible, therefore, to tell whether on the completion of the work the quantities will have been justified and as a matter of prudence he will be inclined to increase his figures to cover this contingency."

While this is perhaps not the most appropriate place to discuss at length the points raised, it may be said they are not unanswerable. Any new system of this kind must be judged by the results. If an engineer is incompetent or corrupt there would seem to be little justification for retaining him in the employ of the city, and if he were so retained the opportunities offered

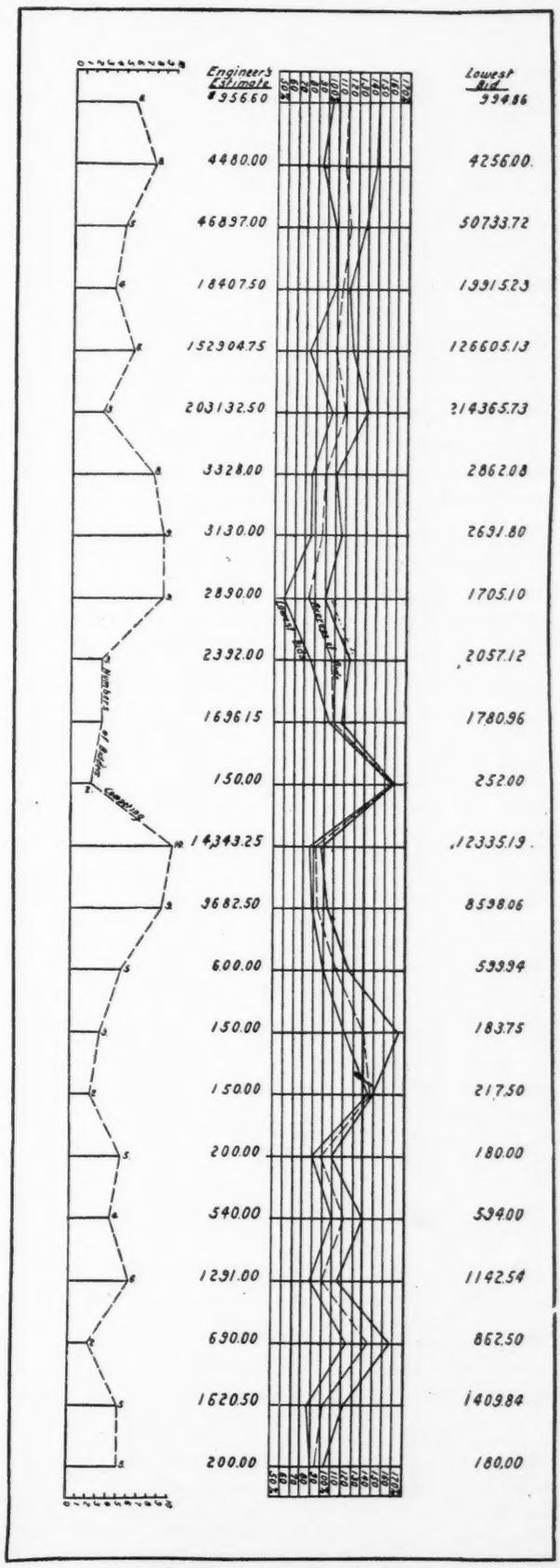


DIAGRAM SHOWING RANGE OF BIDS
Received at Public Lettings in Brooklyn in 1907

under this system of bidding are perhaps no greater than under the ordinary one. I venture the assertion that the standard of honesty among engineers is fully as high as among any other class of city employees, contractors or people of other occupations or professions.

Bids submitted during the past season varied among themselves from ten to forty per cent., while the average of all bids submitted varied from the estimate of the engineer only 2.2 per cent. This would not tend to show any superior ability on the part of contractors in general to estimate accurately the cost of such work. There is much to be said in favor of uniform specifications throughout the different boroughs of the city, yet it is not at all essential that they should be uniform. Conditions vary greatly, and if any material advantage can be gained in one borough by a particular form of specification, it would seem as if as yet no sufficient reason had been advanced why the city should not have that advantage.

It is true that the field of competition has been considerably broadened by the percentage system of bidding, and inevitably new and more or less unexperienced men have entered it. This has necessitated increased labor and vigilance on the part of the engineers to get satisfactory results. It has also materially increased the labor of preparing estimates. Some complications have also arisen with contractors that would not have arisen with men old and experienced in business. But on the whole, the benefits have far outweighed these disadvantages. If uniform specifications are insisted upon, however, it seems as if this system of bidding must be abandoned, because there does not seem to be a disposition to undertake it in the other boroughs, and it is doubtful whether the necessary information has been collected in every borough to enable accurate estimates to be made.

One peculiarity of percentage bidding, and possibly of all kinds of public bidding for contracts, is illustrated by the diagram. This shows that the greater the number of bidders the closer will the average of their bids agree with the engineer's estimate. It also shows that the desirability of a contract from the contractor's standpoint has much to do with the prices bid. The same contractor will bid at the same time upon one contract at one set of unit prices, and upon another with quite a different set, for reasons known only to himself. Since the estimates of several contractors do not agree with each other, nor even those of the same contractor, it cannot be expected that the engineer's estimate can always agree closely with the bids or even their averages. The engineer assumes that the contractor will purchase materials in the open market, paying average prices, and desire a reasonable profit; but he may have special facilities for obtaining materials, or may wish to keep men and plant busy if only at nominal profit.

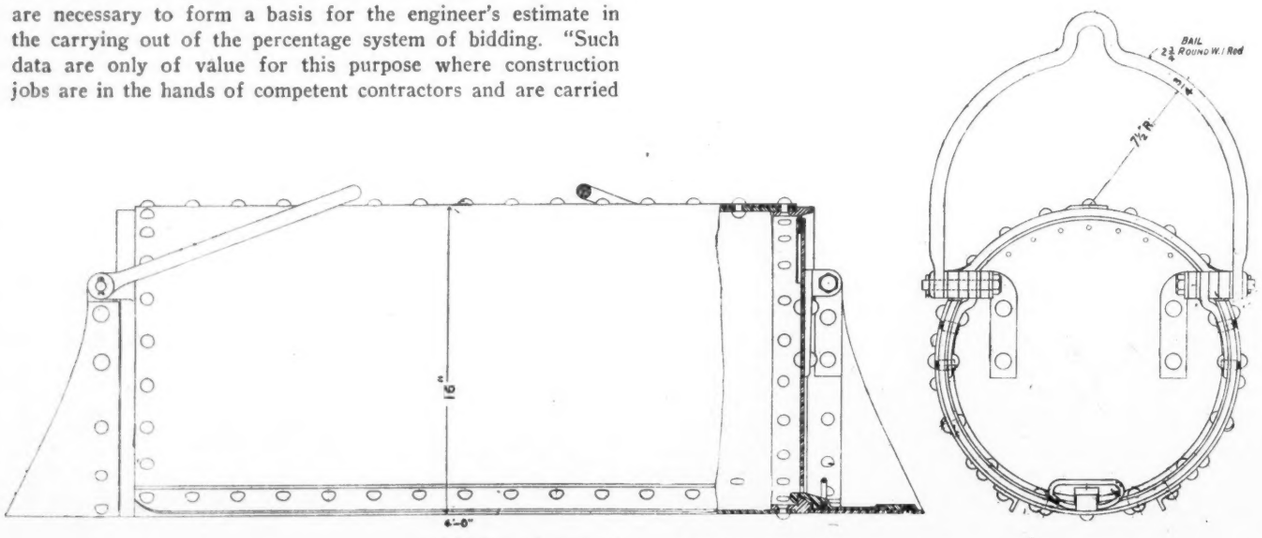
COST DATA

In 1907 a system of cost keeping was inaugurated which was an entire innovation in the Bureau, no public records of cost of work having been kept before then (Mr. Hammond, Engineer of Design, has kept private records concerning city work for 20 years or more.) The value of this, of course, increases as the volume of the data accumulates. Such data are necessary to form a basis for the engineer's estimate in the carrying out of the percentage system of bidding. "Such data are only of value for this purpose where construction jobs are in the hands of competent contractors and are carried out with method and a reasonable amount of skill. Even then great care must be exercised in the use of such data in connection with estimates of work of similar character to avoid error. Circumstances and conditions must be thoroughly understood before such information can be used with confidence. For this reason cost data have not been collected upon many jobs where the methods of work did not seem to warrant it." Since April 1, 1909, not only cost data for construction, but those for all classes of work carried out under the direction of the Bureau of Sewers have been kept upon standard forms; the keeping of such data by all the boroughs having been directed by the Mayor. The whole time of one clerk and part of the time of a general foreman and an assistant is devoted to this work of collecting and compiling these cost data.

RAINFALL AND RUN-OFF OBSERVATIONS

During the summer of 1909 some excellent work was done in collecting rainfall and run-off data for use in designing storm sewers. A committee was appointed some months ago by the Society of Municipal Engineers of Greater New York, this committee consisting of an engineer of the Sewer Bureau in each borough, for the purpose of collecting data in regard to rainfall and run-off, as these affect the design of sewers. Similar work is being done by a committee of the Boston Society of Engineers, which in addition to collecting local data is obtaining as much as possible by correspondence with other cities. The work being done in Brooklyn gives promise that, in this city at least, information of great value, such as heretofore has been lacking but greatly desired, will be obtained. The engineer in charge of this work in the Brooklyn Bureau is Mr. James B. Van Vleck.

It is the intention to thoroughly gauge the storm weather discharge from several drainage areas in each borough, which represent the various stages in urban development, the information thus obtained to be used in an attempt to arrive at more accurate records of determining the capacities required in storm water sewers. For about a year observations have been taken in Brooklyn on a drainage area located between Flatbush avenue, Sixth avenue, Prospect Park West and Union street, these enclosing an area of about 70 acres. The instruments used are a Frieze self-registering rain gauge, two Frieze self-registering depth-of-water gauges (used in sewer manholes for registering depth of sewage flow) together with water meters and other minor appliances. A comparison between the rain gauge records and those of the depth of water in the sewer from minute to minute during a storm would indicate the time required for rainfall at high rates to reach the sewer. One of the elements of this time is that required for the water to



SCOOP BUCKET FOR CLEANING SEWERS

concentrate in the gutter, another the time it is flowing in the gutter to the catch basin. An extensive and very interesting series of experiments for determining the latter have been conducted; and although no figures are yet ready for publication the results already obtained indicate the possibility of evolving approximately accurate formulas for calculating the velocities of gutter flow. It is hoped, after the collection of sufficient data, to study intelligently the time required under various conditions for rain to pass from its point of impact on the surface to the sewer, for the passage of flood waves through the sewer, etc.; also the volumes flowing in the sewer corresponding to various rates and duration of rainfall. While reams of calculations on these various points have been contributed to the various engineering societies, most of these are based on theory with a very meager basis of data on which to work.

CLEANING SEWERS AND CATCH BASINS

Sewer cleaning is done by day labor by the Sewer Department, which employs for this purpose six steel traveling derricks operated by gasoline engines, the whole mounted so as to be easily portable through the streets. The dirt is removed in scoop buckets which, as well as the general plan of the derrick, were designed by Chief Engineer Fort. The bucket is essentially a cylinder with a swinging door and a bail at each end. This cylinder is drawn through the sewer by means of the front bail, being first hauled into the sewer by a rope on the rear bail. The front door swings inward from the top, thus permitting material to enter the bucket but not to leave it while being drawn through the sewer. The rear door is held shut by a latch. The bucket is drawn forward by a rope which passes through a snatch block at the bottom of a manhole and up through the manhole to the derrick which is stationed above it. The scoop bucket is drawn forward through the sewer and then raised to the surface by means of this rope and derrick and is then swung over a cart into which the material is deposited by releasing the bottom catch, allowing the bottom door to drop down. Five men are employed in a cleaning gang, two drawing the bucket back in the sewer and guiding it as it is drawn forward, one at the foot of the manhole to signal to those above and release the rope from the snatch box, one to operate the engine and the fifth to dump the bucket in the cart and receive the signals from below. While no exact figures as to the cost of removing and disposing of this material were obtainable, this was said to be very approximately $1.50 per cubic yard.

The Bureau seems to employ a diligence in cleaning catch basins which is unusual in large cities. There were in the borough, on December 1, 1909, 10,285 catch basins. During the eleven months from January 1st of that year there were 30,619 basin cleanings. From the basins were removed 36,699 cubic yards of soil at a cost of $1.35 per cubic yard, or $1.54¾ per basin. It appears from these figures that the average amount removed from each basin was about 1.2 cubic yards per cleaning. The standard basin is cylindrical, 4 feet in diameter and about 3 feet 8 inches from the bottom to the overflow. The average depth of material in the basin when cleaned, therefore, would appear to have been about 2 feet 7 inches—that is, the material was within 13 inches of the level of the outlet.

That this was not an exceptional year is shown by the following table, giving similar data for the four previous years:

CLEANING CATCH BASINS DURING 1905-1909.

	No. of basins.	Number examined.	Number cleaned.	Soil removed. cu. yd.	Cost per basin.	Cost per cu. yd.
1905	9,257	40,242	17,254	25,512	$1.79	$1.23
1906	9,537	49,768	25,386	33,423	1.65	1.25
1907	9,979	42,327	24,389	35,272	1.63	1.12
1908	10,127	47,933	30,693	44,476	1.60	1.10
11 months of 1909	10,285	54,530	30,619	36,699	1.54¾	1.35

Not only were the basins cleaned an average of about three times a year during the last two years and two-and-one-half times per year during the three preceeding years, but basins were examined and not cleaned from 50 to 100 per cent as often as the actual cleanings.

PURCHASE OF SEWER MATERIALS

From Report of Frederick L. Ford, City Engineer, Hartford, Conn.

DURING the past six years the Hartford (Conn.) Department of Engineering has had charge of the construction of $100,000 worth of sewers per year. In view of the magnitude of this work one cannot fail to be impressed with the hand-to-mouth policy followed in the purchase of materials for these contracts. All of this work is done by private contractors, each contract being awarded to the lowest responsible bidder after proper advertisement. A large proportion of the cost of this work is paid for by the abutting property owners, the only exception being in the construction of large interceptors paid for by the city at large, as the benefits are general rather than local.

A great many of the sewer contracts are small, involving expenditures of but a few thousand dollars. The sewer contractors buy the materials where and when they please, often in small quantities, especially when the contracts are small, as they are in many cases. By this policy no materials for sewer construction are kept on hand; in fact, orders for it are not even placed until after the award of the contract. This results under ordinary circumstances, in a vexatious delay of several weeks, waiting for materials with which to begin work. This method, from the city's standpoint, is as unsatisfactory as it is expensive. I cannot see why the city, with its unlimited credit, should not buy in large quantities, directly through the Board of Contract and Supply, all of the materials and supplies used in sewer construction and maintenance, rather than in small quantities through private contractors with limited capital and credit. I cannot see any reason or excuse why the city should pay a second commission on this material to each sewer contractor in addition to the regular dealers' commission. By purchasing directly from the manufacturers or dealers the city would not only save the second profit now paid the sewer contractors, but it would obtain the further and greater advantage of buying in large quantities with a large financial backing. In my judgment all vitrified tile, brick, cement, sand, crushed stone, manhole frames and covers, lumber, etc., used in sewer construction should be purchased by the city in large, preferably yearly, quantities. During the latter part of each construction season the Department of Engineering should make requisition on the Board of Contract and Supply for the material needed for the next season's work. If the Board of Street Commissioners would pool their interests with the Department of Engineering in the purchase of supplies, even better figures would be obtained.

While the crushed stone and sand used in the construction and maintenance of the streets of Hartford are purchased in large quantities, under contract, a great deal of the material used in the construction and maintenance of catch basins, sewer manholes, bridges, culverts, etc., in charge of the Street Department is purchased in small quantities, and undoubtedly at higher prices than if bought in larger quantities. These two departments have charge of an average annual expenditure of about $500,000, and I believe that a great financial saving would result in carrying out the policy here indicated. A further advantage would obtain from the purchase of the materials in advance of the commencement of the work, thereby eliminating the present vexatious delays in waiting for deliveries oftentimes greatly interfered with in transit.

SEWAGE PURIFICATION IN WISCONSIN

ACCORDING to Professor Davis, of the University of Wisconsin, and State Chemist Bowles, the sewage purification plants in Wisconsin are as follows: Dane County Poor Farm, Elkhorn (residential septic tanks), Lancaster, Madison, Marshfield, Mendota Hospital, Milwaukee County Institutions, Northern Hospital, Monroe, Tomah, Wales Sanitarium, Wauwatosa, Waukesha, West Salem. All these are septic tanks. In addition all filter effluent except Elkhorn, Tomah, Wales Sanitarium, Waukesha and West Salem. Marinette, Ripon and Soldiers' Home use filters only. At North Milwaukee are sedimentation tanks, aeration and filters. Athens, Menominee Falls, Waupaca and West Bend have had plans for tanks approved.

SEWER WORK BY DAY LABOR AND BY CONTRACT

Comparison of the Cost and Efficiency—Relative Prevalence of the Two Methods of Doing Work—Average Cost per Foot in Several Cities—Wages, Length of Day and Holidays—Conclusions

By HARRISON P. EDDY, Consulting Civil Engineer, Boston, Mass.

From paper before Section I of the American Association for the Advancement of Science, Dec. 28, 1909

AMONG the various lines of investigation carried out by the late Boston Finance Commission were several which threw considerable light upon the relative efficiency of the contract and day-labor systems and some of the causes of the inefficiency of the day-labor forces of the city of Boston.

An effort was made to ascertain as nearly as possible the actual facts in all cases, and to reduce the conditions to figures, thus eliminating opinions. The results of these investigations are, therefore, interesting and important, as showing the results of conditions surrounding city departments, and not as exploiting theories of ideal conditions, which are rarely found in any city.

While most of the data refer to the city of Boston, it is believed that the lessons drawn from them are typical, and that similar results would be obtained from like investigations in many other cities.

RELATIVE PREVALENCE OF CONTRACT AND DAY-LABOR SYSTEMS.

In order to ascertain the general municipal practice throughout the country in building water works and sewerage systems, a postal card inquiry was sent to all cities in Massachusetts and to all cities in the country exceeding 30,000 in population, as shown by the Census Bureau in 1905. The results of this inquiry appear in table 1. The questions were so worded as to apply only to ordinary extensions, and it is probable that in some cases work upon new systems may have been done by contract, while ordinary extensions were made by day labor.

Table I—Relative Prevalence of Contract and Day Labor in Sewer Construction in American Cities of Populations Exceeding 30,000 (Not Including Boston)

POPULATION	Number of Cities of Specified Size (1905 Census Estimate)	Number of Cities Enumerated	Cities Doing Work Wholly by Contract	Cities Do-Doing Work Wholly by Day-Labor	Per Ct. of Cities Doing Work by Contract
30,000– 50,000	67	31	20	11	65
50,000–100,000	47	22	15	7	68
100,000–150,000	14	8	5	3	63
150,000–200,000	6	2	2	..	100
Over 200,000....	20	10	10	..	100
Totals.....	154	73	52	21	71
Outside of New England.....	126	51	48	3	94
New England, excepting Mass'ts	10	6	4	2	67
Massachusetts....	18	18	1	17	6

Postals were sent to 154 cities, and replies relating to sewerage systems were received from 73 cities, and relating to water works extensions from 58 cities.

Of the 73 cities making replies to the inquiries relating to sewerage systems, 52, or 71 per cent, were found to be doing this class of work wholly by contract. Of the cities located outside of New England 94 per cent were found to be doing their work by contract, while but 67 per cent of the cities in New England outside of Massachusetts were using this system, and in Massachusetts only 6 per cent. The prevalence of the day-labor system in Massachusetts is very strikingly shown by these figures, which, it should be noted, are based upon replies from all of the 18 cities to which inquiries were sent. Putting it in another way, of the 18 cities in Massachusetts one was doing its sewer work wholly by contract, while 17 were doing similar work wholly by day labor.

COMPARATIVE COSTS OF DAY-LABOR AND CONTRACT SEWER WORK IN VARIOUS CITIES

A comparison was made of the cost of building sewers in cities where work was known to be done by day labor with that in other cities where similar work is done by contract. These comparisons were confined to New England cities, and very largely to cities in Massachusetts.

To make this investigation less difficult and reduce the element of uncertainty as much as possible, the inquiry was confined to small pipe sewers, from 8 inches to 12 inches in diameter. Since most sewers of this class built in Boston have been constructed under contracts (largely "gift" or non-competitive contracts), the number available for comparison was smaller than was desired. As the difficulty in selecting work done under comparable conditions was fully realized, and as such selection could only be made by engineers familiar with local conditions, an assistant was sent from place to place to interview the local engineers, who always very kindly, and at times at considerable inconvenience to themselves, carefully considered the conditions surrounding a large number of pieces of work, and advised which should be selected for use in this comparison. The number of sewers selected in each city was small, but included all which could be classed as being built under conditions enabling fair comparison within the last few years. While it is realized that this study may be criticised as being based upon fragmentary and possibly insufficient data, it is presented as comprising the best data which could be obtained after a long and earnest effort to get at the truth. Unfortunately, in no city except Boston was this class of work found to be done both by day labor and by contract, so that comparisons between the two methods in the same city were impossible, with the single exception noted.

Table II—Average Total Cost Per Foot of Comparable 12-inch Sewers Laid 10 Feet Deep in Various Cities

"A"—BUILT BY DAY-LABOR

CITY OR TOWN	Prevailing Diameter of Sewer (Inches)	Actual Total Cost per Foot	Total Cost of Equivalent 12" Sewer Without Allowance for Difference in Wages	SUBDIVISION OF COST INTO		
				Labor & Teaming Only	Materials and Sundries	Engineering
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Brockton.....	8	$1.73	$1.96	$1.20	$0.68	$0.08
Cambridge....	8	2.35	2.58	1.70	0.81	0.07
Everett.....	8	2.09	2.32	1.55	0.68	0.09
Fitchburg.....	12	1.80	1.80*a*	0.95	0.77	0.08*a*
Haverhill.....	10	1.68	1.80*a*	0.90	0.82	0.08*a*
Lawrence.....	10	2.38	2.50*a*	1.80	0.62	0.08*a*
Lowell.....	10	2.30	3.42	2.35	0.98	0.09
Medford.....	8	1.80	2.03	1.05	0.92	0.06
New Bedford..	10	1.88	2.00	1.30	0.67	0.03
Newton.....	8	1.65	1.88	1.05	0.73	0.10
Quincy.....	8	1.54	1.77	1.00	0.68	0.09
Worcester.....	10	2.00	2.00*b*	1.20	0.70	0.10
Average..	..	....	$2.17	$1.34	$0.75	$0.08
Boston...	12	$5.20*d*	$5.20	$3.50*c*	$1.55	$0.15

*a*Engineering estimated $0.08 per ft.
*b*Exclusive of office and shop charges as in other cities.
*c*Owing to the fact that this figure is based upon a comparatively small number of examples, it should be used with caution.
*d*Not including proportion of undivided construction cost, which amounts to about 5% of total construction cost.

"B"—BUILT BY CONTRACT

Brookline.....	8	$1.73	$1.95	$0.80	$0.80	$0.25*e*
Portland.....	10	1.50	1.62	0.65	0.81	0.16*e*
Providence....	12	1.68	1.68	0.65	0.83	0.20*e*
Somerville....	8	1.75	2.05	0.90	0.91	0.24*e*
Average..	..	....	$1.82	$0.75	$0.86	$0.21
Boston...	12	2.35	$2.35	$1.05*f*	$0.90	$0.40

*e*Engineering and inspection.
*f*Advertised contracts only.
NOTE—That *no correction has been applied on account of differences in wages.*
NOTE—That the *day-labor* cost shown in Column 4 includes labor on manholes, whereas the *contract labor* does not include this, but does include loss on sheeting, which substantially offsets it.

These investigations were made in 17 cities, 13 of which do their work by day labor (including Boston, which does part of its work by day labor and part by contract), and 5 (including Boston) which do the work by contract. The average cost of building 12-inch sewers in 12 cities was found to be $2.17 per linear foot, while in the city of Boston similar work appeared to cost $5.20 per linear foot. Like work done by contract was found to cost on the average $1.82 in 4 cities, while in Boston it cost $2.35. The average cost of labor and teaming in cities, exclusive of Boston, where the work was done by day labor, was $1.34 per linear foot, while in the four cities doing work by contract this cost averaged $0.75 per linear foot, while upon that done by contract it was $3.50 per linear foot, while upon that done by contract it was $1.05 per foot, a reduction of 70 per cent.

In tables 3 and 4 the cost of labor upon small sewers built by day labor and by contract has been tabulated after being reduced to a uniform basis of wages of $0.315 per hour, the rate paid in Boston.

Table III—Cost of Labor, Teaming and Engineering upon Small Sewers Built by Day-Labor

LABOR COSTS REDUCED TO UNIFORM BASIS OF $0.315 PER HOUR, AS PAID IN BOSTON (DATA REDUCED TO UNIFORM BASIS OF 12-IN. PIPE LAID 10 FT. DEEP)

CITY OR TOWN (1)	Cost of Labor per Ft., Inc. Teaming, Exc. Office and Shop Charges (2)	Nominal Wage per Day of Eight Hours (3)	Actual Net Rate of Wage per Hr. for Common Labor (4)	Cost per Ft. of Labor Red'c'd to Comparable Basis (Rate = $0.315 per Hour) (5)	Cost of Teaming Per Foot (6)	Cost of Engineering per Foot (7)
Brockton	$1.20	$2.25	$0.281	$1.34	$0.03*a*	$0.08
Cambridge	1.70	2.00	0.267	2.01	0.06	0.07
Everett	1.55	2.00	0.261	1.87	....	0.09
Fitchburg	0.95	1.75	0.220	1.36	....	....
Haverhill	0.90	2.00	0.250	1.13	....	....
Lawrence	1.80	2.00	0.250	2.27	....	....
Lowell	2.35	2.00	0.250	2.96	....	0.09
Medford	1.05	2.00	0.250	1.32	....	0.06
New Bedford	1.30	2.00	0.250	1.64	0.04	0.03
Newton	1.05	1.75	0.219	1.51	0.06	0.10
Quincy	1.00	1.75	0.219	1.44	....	0.09
Worcester	1.20	1.85	0.231	1.63	0.11	0.10
Average	....	....	$0.246	$1.79	$0.06	$0.08
Boston	$3.50*b*	$2.25	$0.315	$3.50*b*	$0.50	$0.15*c*

*a*Contract teaming only—Department has one horse and wagon.
*b*Not including proportion of undivided construction expenses, which amount to about 5% of total construction cost. Furthermore, owing to the fact that this figure is based upon a comparatively small number of groups, it should be used with caution.
*c*Estimate.

Table IV—Cost of Labor, Teaming and Engineering upon Small Sewers Built by Contract

LABOR COSTS REDUCED TO UNIFORM BASIS OF $0.315 PER HOUR AS PAID IN BOSTON (DATA REDUCED TO A UNIFORM BASIS OF 12-INCH PIPE LAID 10 FEET DEEP)

CITY OR TOWN (1)	Cost per Foot for Labor and Teaming*a* (2)	Corresponding Rate Wages of per Hour (3)	Cost of Labor*b* Reduced to a Comparable Basis (Rate of Wage = $0.315 per Hour) (4)	Cost of Engineering and Inspection (5)
Brookline	$0.80	$0.22	$1.15	$0.25
Portland	0.65	0.20	1.02	0.16
Providence	0.65	0.17	1.20	0.20
Somerville	0.90	0.22	1.29	0.24
Average	$0.75	$0.20	$1.17	$0.21
Boston*c*	$1.05	$0.25	$1.32	$0.40

*a*Exclusive of labor in manholes but including loss on sheeting. It is estimated that these two items substantially balance each other so that the figures are directly comparable with the *day-labor* figures of Table III.
*b*It should be noted that contractors in Boston usually pay but $0.25 per hour for labor, unless required to pay higher wages by the city.
*c*Advertised contracts only.

Reduced to this basis, it appears that the cost of sewers built by day labor (not including Boston) averaged for labor $1.79 per linear foot, while in the cities doing work by contract (excluding Boston) the average cost of labor was $1.17. Treating in the same manner similar work done in Boston by day labor and by contract, it is found that the labor cost was $3.50 and $1.32 per linear foot, respectively. It therefore appears that had the rate of wages been uniform in all cities, the labor cost of the work done by contract would have been 35 per cent less than the labor cost of that done by day labor, not including Boston in this comparison. Comparing the work done by both methods in the city of Boston, it appears that had the work done by day labor been done by advertised contract the reduction in the cost of labor would have amounted to over 62 per cent.

COMPARATIVE COST OF SEWERS BUILT BY DAY LABOR AND BY CONTRACT IN BOSTON

The cost of eight pairs of sewers, so selected as to be as nearly comparable with each other as possible, have been compiled in table 5. In each pair one sewer was built by day labor and one by contract. The pairs were selected by engineers employed by the city, who had direct personal knowledge of the conditions under which the work was done. After reducing the costs to equal terms as to size, depth and wages, it appears that in the case most favorable to day labor the cost of the sewer built by direct labor was nearly double that of the one built by contract, while in the case of the pair most favorable to the contract system the one built by day labor cost nearly four times as much as the one built by contract.

THE RELATIVE COST OF CLEANING CATCH-BASINS BY DAY LABOR AND BY CONTRACT

A study was made of the cost of cleaning catch-basins by day labor and by contract. This study included the cost of cleaning nearly 9,000 catch-basins at a total expense of over $54,000. The cost of doing this work by day labor averaged $6.39 per catch-basin, or $2.47 per cubic yard of refuse removed from the basins, while that done by contract cost $4.15 per basin, or $1.46 per cubic yard.

EFFICIENCY OF LABOR AND RATE OF WAGES PAID

An effort was made to ascertain the prevailing rate of wages paid by contractors in the vicinity of Boston for work similar to that performed by the city Water and Sewer Departments. Data were obtained from 35 different contractors.

The minimum rate of wages paid in this vicinity appears to be $0.15 per hour, and the maximum did not exceed in any case $0.30 per hour. Comparatively few laborers are employed at rates of pay exceeding $0.25 per hour, while large numbers are paid as low as $0.20. In general, it may be stated that English-speaking laborers are paid more than others, and, further, that the rate of $0.30 applies quite generally to building laborers or to laborers who possess rather more than average skill. In no case was it found that laborers were paid for legal holidays, and only in two instances were Saturday afternoons allowed. None of the contractors gave Saturday afternoons off with continued pay, and in no case were laborers paid in event of absence from work on account of injuries received.

The contractors furnishing data do not "carry" their employees through the winter unless they have work which must be done. In other words, they do not "find' work for their laborers during the winter season, as do the city departments, and consequently they do not give continuous employment.

Inquiries were sent to sewer departments of all the cities in Massachusetts and several of the larger cities of the other New England States to ascertain the length of day and the rate of wages in force upon municipal sewer work in the city departments. The data thus collected is compiled in table 6. Several of the cities included in this inquiry performed their construction work by contract, so that the figures given in those cases apply only to the maintenance forces. From this data it appears that the prevailing length of day is 8 hours, although in some cases a 9-hour day is required. Excluding Boston, the nominal rate of pay varies from $0.17 to $0.287 per hour, while the prevailing rate of pay may fairly be said to not exceed $0.25 per hour. In about one-third of the cities the laborers are permitted to have half holidays on Saturday, although in about one-half of these cases the half holidays are restricted to the summer months. In several of the cities where half holidays

are granted the length of day is so arranged that the laborers work 48 hours during the week. In five cities granting Saturday half holidays laborers are paid in full for Saturdays during the summer months (varying from two to six months).

From a comparison of the wages paid by contractors and by municipalities, it is evident that city laborers are paid considerably more than laborers employed by contractors, and that they work fewer hours per week. It is difficult to determine the relation existing between high wages and the efficiency of the employee. It is doubtless true, however, that higher wages are paid by municipalities very largely because of political influence.

The following tabulation made up from Table 3 shows the number of feet of sewer laid for one dollar when the wages are reduced to a uniform basis of calculation. The percentage of efficiency is calculated on the assumption that the Brockton labor was 100 per cent efficient.

Table VII—Number of Feet of Sewer Laid for $1 When Wages Are Reduced to Uniform Basis.

	Rate of Wages Actually Paid, per Day.	Rate of Wages Actually Paid, per Hour.	Number of Feet of Sewer Laid for $1, Figured on Uniform Basis.	Per Cent. Efficiency Assuming 100% Eff. in the One Case when Wages were $0.281.
Brockton	$2.25	$0.281	$0.746	100%
Seven cities	2.00	0.254	0.529	70.9
Worcester	1.85	0.231	0.613	82.1
Three cities	1.75	0.219	0.694	93.0
Boston	2.25	0.315	0.286	38.3

* Allowance made for legal holidays for which full pay is allowed.

TABLE V—BOSTON SEWER DEPARTMENT

COMPARISON OF COSTS OF CERTAIN COMPARABLE PIPE SEWERS LAID IN BOSTON BY DAY LABOR AND BY CONTRACT

LOCATION	How Done	Date	Length (Feet)	Size	Average Cut (Feet)	No. Manholes	Rock, Cubic Yards	Cost per Lineal Foot	Cost per Foot on Equal Terms	Ratio of Day Labor to Contract Costs Per Cent.
Allston Place between Woodstock Ave. and Corey Road, Brighton	Day	Jan. 27 to March 2, 1905	304.03	12	10.5	2	( )	$5.59	$5.59	2.4
Corey Road from Allston Place, 400 ft. S. W. Brighton	Contract	Aug. 23 to Sept. 17, 1907	400.00	10	12.3	2	4.81	2.42	2.34	
Willow St., between Dunbar and Weld Sts., W. Roxbury	Day	Aug. 18 to Nov. 9, 1905	1,126.57	12	11.6	5	(150)	7.74	7.74	3.2
Maple St., between Addington Road and Weld St	Contract	Jan. 10 to May 25, 1906	1,100.00	12	10.7	6	218	2.25	2.45	
Dunboy St., between Hardwick and Bigelow Sts	Day	Sept. 16 to Oct. 1, 1904	175.65	12	7.0	1	No	5.13	5.13	3.7
Hardwick St., Bigelow to Dunboy St	Contract	May 2 to 18, 1904	756.4	12	7.2	4	18.89	1.41	1.38	
Revere St., between Charles and 136 ft. west	Day	July 28 to Aug. 16	132.32	12	14.4	2	....	13.98	13.98	2.1
Tennyson St., between Church and Pleasant Sts	Contract	Oct. 26 to Nov. 10, 1906	221.07	12	10.6	..	1.66	5.05	6.48	
Charles St., between Revere St. and 230 ft. northerly	Day	June 11 to 13, 1904	230.6	12	10.5	..	....	5.96	5.96	Rush job 2.0
Hale St., between Green St. and Hale St. extension	Contract	June 8 to July 3, 1903	269.3	12	11.7	2	....	3.35	2.98	
Charter St., between Phipps St. and Marshall Place	Day	June 30 to July 20, 1905	191.57	15	10.6	..	....	7.79	7.79	1.48
Hanover St., between No. Bennett and Charter St	Contract	Oct. 28 to Nov. 30, 1906	333.33	12 / 15 / 18	9.3	..	....	4.68	5.26	
South St., Kneeland to Beach St	Day	Jan. 30 to May 2, 1903	318.1	18	16.6	..	....	21.39	21.39	2.78
Fayette St., Church St. to Federal St	Contract	Sept. 16 to Dec. 5, 1906	384.7	18	13.1	..	....	6.29	7.68	
North St., Blackstone St. to North Center St	Day	Nov. 4 to Dec. 17, 1903	141.51	30x36, Brick	612.6	..	....	45.44	45.44	2.74
Cooper St., between Washington St. north and Endicott St	Contract	Aug. 5 to Oct. 10, 1907	210.1	30x36, Brick	12.6	..	....	16.54	16.54	

NOTE—These pieces of work were picked out by the District Engineers as substantially comparable.

Lineal foot costs are based on total cost of labor, teaming, explosives and supplies, excluding engineering and administration, office and yard departmen cost of materials, *i.e.*, pipe, brick, cement, manhole covers and steps. In each comparison the lineal foot costs are reduced to terms of like diameter of sewer and like average depth of trench.

TABLE VI—STATISTICS CONCERNING THE DAY-LABOR FORCES OF THE SEWER DEPARTMENTS OF VARIOUS CITIES

CITY	Number of Laborers	Length of Day	Rate of Pay Nominal (per Hour)	Rate of Pay Actual (per Hour)	Saturday Half-Holidays Allowed	Pay For Saturday Half-Holidays	Allowance For Sick Leave
Lynn, Mass	101	8	28½ cts.	28.7 cts.	May-October	Yes	None*b*
Haverhill, Mass	.....	9	28½ "	28.7 "	June-September	Yes	None*d*
Fall River, Mass	178	8½	28½ "	28½ "	Yes	*f*	None
Brockton, Mass	70–100	8	28½ "	28½ "	No	.....	None*d*
New Haven, Conn.*a*	.....	9	27⅞ "	27⅞ "	No	.....	None*b*
Cambridge, Mass	21	8	25 "	26.1 "	May-November	Yes	None
Springfield, Mass	78–153	8	25 "	25½ "	Work 7 hours	Yes	None*d*
Chicopee, Mass	.....	8	25 "	25 "	No	.....	None*b*
Holyoke, Mass	.....	8	25 "	25 "	Yes	.....	*b*
Lawrence, Mass	114	8	25 "	25 "	Yes	*f*	Half pay
Lowell, Mass	.....	8	25 "	25 "	In Summer	*f*	None
Marlboro, Mass	.....	8	25 "	25 "	No	.....	None
Medford, Mass	.....	8	25 "	25 "	No	.....	None
New Bedford, Mass	86	8½	25 "	25 "	Yes	*f*	None*b*
Newport, R. I	.....	8	25 "	25 "	No	.....	None
Waltham, Mass	.....	8	25 "	25 "	No	.....	None*d*
Newburyport, Mass	5	8	25 "	25 "	No	.....	None
Quincy, Mass	.....	8	23½ "	23½ "	No	.....	None*e*
Worcester, Mass	168	8	23½ "	23½ "	No	.....	None
Hartford, Conn.*a*	.....	9	22⅞ "	22⅞ "	No	.....	None
Waterbury, Conn	14	9	22⅞ "	22⅞ "	No	.....	None*d*
Bangor, Maine	4	9	22⅞ "	22⅞ "	No	.....	None
Fitchburg, Mass	.....	8	22 "	22 "	No	.....	Full pay*c*
Albany, N. Y.*a*	.....	8	21⅝ "	21⅝ "	No	.....	None
North Adams, Mass	28	8	21⅝ "	21⅝ "	No	.....	None*d*
Newton, Mass	75	8	21⅝ "	21⅝ "	No	.....	None
Concord, N. H	.....	9	19⅝ "	19⅛ "	No	.....	None*b*
Portland, Maine *a*	.....	9	19⅝ "	19⅛ "	No	.....	None*e*
Hudson, N. Y	.....	8	18¾ "	18¾ "	No	.....	Full pay
Providence, R. I.*a*	84	9	17 "	17.2 "	July-August	Yes	None*d*
New London, Conn	40	9	16⅔ "	16⅔ "	No	.....	None*d*
Somerville, Mass.*a*	8–15	8	.....	.....	In Summer	.....	None*d*
Boston, Mass	2000	8	30¾ "	31⅓ "	Yes	Yes	Full pay*d*

a Maintenance only; construction by contract. *b* In case of injury, submitted to a committee. *c* Full pay may be allowed not to exceed 60 days when approved by Mayor. *d* Full pay if injured on work. *e* Unless injured on work. *f* Work 48 hours per week, but time divided so that Saturday is a half-holiday.

While it may not be fair to draw the conclusion from these figures that labor is less efficient *because* of higher wages, it does seem to follow that higher compensation does not *assure* greater efficiency. The greatest efficiency was apparently obtained in the case of the city of Brockton where the nominal wage is $2.25 per day, although in Boston, where the same nominal wage is paid and holidays granted in sufficient number to increase the rate per hour over 12 per cent, the lowest efficiency was indicated. Averaging the results obtained in cities paying the same rate of wages, there appears to be a gradual decrease in efficiency as the rate of pay increases.

HOLIDAYS AND SICK LEAVE

The effect of political influence is shown very clearly in the granting of holidays and sick-leave with pay to city laborers. The cost of holidays, half-holidays and sick-leave is an item the magnitude of which is not very generally appreciated. The Boston Water Department has very carefully compiled statistics relating to this source of expense. During 1906 the distribution division expended upon pay-rolls about $450,000, and the amount charged to holidays, half-holidays and sick-leave amounted to over $34,000, or 7.7 per cent of the total pay-roll. The lowest percentage for any month was 5.3, and the highest was a little over 10 per cent of the respective pay-rolls. During the first eight months of 1907 the money paid for holidays and sick-leave amounted to 8.3 per cent of the total cost of labor. During this entire period of 20 months, the pay-rolls amounted to $752,000, and nearly $60,000, or 7.95 per cent of the amount of the pay-rolls, was expended for holidays and sick-leave.

AGE OF LABORERS

Perhaps one of the most frequent criticisms by the public of day-labor departments is that the men employed are too old for the work they are required to do, and consequently that the amount of work done per man per day is ridiculously small. This appears to be the universal opinion, and unfortunately in many cases there is much to substantiate it. An investigation of the Boston Sewer Department furnishes considerable interesting information pertinent to this criticism. Of the employees of this department, the investigation included 715 connected with the labor service. The ages of the various employees, as well as their terms of service, were obtained from the State Civil Service records, and are classified in Tables 8 and 9.

Table VIII—Labor Employed in Boston Sewer Department, Classified According to Age.

Present Age	No. of Men	Per Cent. of Force	No. of Men Above Ages Designated	Per Cent. of Force Above Ages Designated	Term of Service, Years		
					Avg.	Max.	Min.
Below 20	1	0.1	.....	0	2	2	2
20–24	5	0.7	20–714	20–99.9	3.2	9	0
25–29	19	2.7	25–709	25–99.2	3.8	12	0
30–34	53	7.4	30–690	30–96.5	6.1	15	0
35–39	101	14.1	35–637	35–89.1	7.5	18	0
40–44	127	17.7	40–536	40–75.0	9.9	22	0
45–49	136	19.1	45–409	45–57.3	13.0	28	0
50–54	95	13.3	50–273	50–38.2	12.7	32	0
55–59	81	11.3	55–178	55–24.9	15.3	33	2
60–64	65	9.1	60– 97	60–13.6	14.8	35	1
65–69	21	2.9	65– 32	65– 4.5	13.6	21	1
70–74	9	1.3	70– 11	70– 1.6	17.3	23	11
75–79	2	0.3	75– 2	75– 0.3	32.0	40	24

NOTE—Investigation made in 1907.

Table IX—Classification of Labor by Term of Service and Age. Boston Sewer Department.

Present Age	Years of Service									
	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	Total
19	1	..	..	..	..	..	..	..	..	1
20–24	3	2	..	..	..	..	..	..	..	5
25–29	10	8	1	..	..	..	..	..	..	19
30–34	19	25	8	1	..	..	..	..	..	53
35–39	28	28	38	7	..	..	..	..	..	101
40–44	26	26	41	30	4	..	..	..	..	127
45–49	8	20	52	43	9	4	..	..	..	136
50–54	7	21	26	31	7	2	1	..	..	95
55–59	2	11	18	34	11	2	3	..	..	81
60–64	4	6	20	28	3	..	2	2	..	65
65–69	2	2	6	5	6	..	..	..	..	21
70–74	0	0	2	4	3	..	..	..	..	9
75–79	0	0	0	0	1	..	..	..	1	2
Total....	110	149	212	183	44	8	6	2	1	715

Considering these tables as of the date of their preparation (1907), it is found that of the 65 men who were from 60 to 64 years of age, four had seen less than five years of service in the department; 6 had seen from 5 to 9 years' service; 20 between 10 and 14 years; 28 between 15 and 19 years; *and only 7 had served the department 20 years or more.* Of the 21 men from 65 to 69 years of age, two had worked less than 5 years; two others from 5 to 9 years; six from 10 to 15 years; five from 15 to 20 years; *and only six had been employed in the department 20 years or more.* Of the 9 men from 70 to 74 years old two had labored from 10 to 14 years; four from 15 to 19 years, and *three only for 20 years or more.* There was one man over 75 years of age and he had labored *40 years or more for the department.* Sixty-one (9 per cent) of the 715 employees had worked 20 years or more. *There were 97 employees over 60 years of age, but only 18 of them (18.5 per cent) had served the department for 20 years or more.*

Many will maintain, and with much justice, that men who have worked for the city for 20 years are entitled to consideration, but from the following statement of facts it appears that few are in need of charity. Of the 56 men who were over 40 years of age, and who had served 20 years, 9 were employed as watchmen, which work they could perfectly well do. Four were filling positions for which they were not suited, and three were filling absolutely useless positions, leaving 40 men out of 56 men who were performing laborious work. Stating this matter in a different way, it appears that out of 715 laborers there were only 16 who were 40 years of age or older, who had served the city 20 years, and who were incapacitated for laborious work, and of these 16, nine were able to serve as watchmen. This condition leads to doubt as to the necessity for establishing a pension system for the labor force unless such system is to be established for the benefit of employees who have passed their years of usefulness in the service of other employers, and who have late in life received, probably through political influence, positions upon city work.

The policy of appointing men upon the labor service after they have passed their years of usefulness in the service of other employers had turned the department into a semi-charitable institution, where aged and infirm men were employed when they should have been the charges of relatives or of the public, and not placed upon the city pay-rolls at wages higher than first-class able-bodied laborers at similar work could command from other employers.

EXPERIMENT TO TEST THE EFFICIENCY OF THE DAY-LABOR FORCE

All of the work upon which the previous comparisons and comments as to efficiency have been made was work done prior to the investigations, which were consequently studies of records of work already completed. It was not, therefore, possible to know accurately the conditions under which the work was done. At the request of the Mayor of Boston, a test was made at the Chestnut Hill stone crusher (a municipal plant which had been shut down) to determine whether or not it was possible for the day-labor force to produce broken stone at a cost fairly comparable with that of similar stone purchased by contract. The test covered a period of three months during the summer of 1908, and was under the observation of a disinterested engineer, who kept accurate record of what was done, but who did not in any way supervise or direct the forces. The work consisted of stripping and quarrying the stone, hauling it to the crusher and breaking it.

The test lasted a sufficient length of time to demonstrate with accuracy the cost of producing broken stone by day labor under the existing conditions. The force consisted of men apparently as skilful and competent as could be selected from the employees of the Street Department, and certainly gave evidence of being reasonably skilful and competent. So far as could be observed, the foreman in charge was given an absolutely free hand to organize his force as he deemed best, and to adopt such methods of handling the work as he might de-

sire. With slight and unimportant exceptions, tools and supplies were promptly furnished, so that there is no reason to think that the output could have been increased by the improvement of conditions depending upon the co-operation of the superior officers of the department. The net result of this test appears to be that broken stone was produced at a cost of $1.075 per ton. These figures make no allowance for the cost of clerical service at the office or for the cost of administration, which items are estimated at $0.05 per ton; and no allowance was made for the cost of the quarry. Depreciation of plant and the rental of tools were included in the cost of producing the stone.

The quarry and crusher selected were the most favorable of any of the eight which the city had worked in the past, and in 1895 produced broken stone more cheaply than any other of the city crushers. It is only fair to add that during the second and third periods of the tests, the time being divided into three periods, there was a marked increase in the efficiency of the force. A fair estimate of the cost of the output of broken stone during these latter periods was $0.95 to $1.00 per ton, no allowance being made for administration nor for owning and maintaining of the quarry. For comparison an instance was found where the operations of a large broken stone company were started with certain temporary machinery, which was rented to a contractor, who crushed stone for a period of four or five months. The physical conditions were fairly comparable with those at the Chestnut Hill plant. The crusher was similar, the output was smaller, and rental was paid for the machinery. The cost to the contractor for this work was $0.45 per ton, not including interest and depreciation, which would bring the cost up to $0.50 per ton. It therefore seems fair to conclude that the work which cost the city practically $1.12 per ton, including administration expense, would have cost a competent contractor about $0.50 per ton. It should be borne in mind that this does not include any profit upon the work.

RÉSUMÉ

The foregoing discussion of a small proportion of the studies made under the direction of the late Finance Commission is very brief, for many of the studies required months of work. For the full reports, fifty-nine in number, made by Metcalf & Eddy, reference may be made to Volume 3 of the report of the Boston Finance Commission.

While the difficulties of such investigations are many, it is believed that the results recorded represent very conservatively the conditions existing. It is apparent that municipal work done by day labor is in general, under the conditions of to-day, much more expensive than similar work done under the same conditions by contract. It is also apparent that the labor force in city departments where work is done by the day-labor system is very inefficient as compared with similar forces employed by contractors, and has during the last ten or fifteen years decreased greatly in efficiency, at least in the city of Boston.

There are many causes of the excessive cost of day-labor work and of the inefficiency of the day-labor forces, all of which may be grouped under the one great evil—the entrance of politics into municipal business. These causes include abnormal rates of pay, the granting of holidays and half-holidays, the employment of aged and physically incompetent laborers, absence of discipline, a lack of incentive, and the inexperience of those in executive positions. It would further appear that the number of men growing old in the service of the city, who were at the time of their original employment young and vigorous, is not a material cause of inefficiency. On the other hand, the employment of men in city departments who have passed their years of usefulness in the service of other parties has a demoralizing effect upon the labor forces, and has undoubtedly been the cause of much of the inefficiency noted in municipal day-labor forces.

SEWERAGE STATISTICS

Approximately $250,000,000 Worth of Sewers in the Country — Percentage of Combined and of Separate Systems—Sewage Purification—Sewer Flushing—House Connections—Pumping

We present herewith tables giving statistics concerning the sewerage systems in the 158 largest cities of the United States —all of those having more than 30,000 population—giving the total amount of sewers and the length of brick and that of tile sewers in each of the cities for the three years 1903, 1905 and 1907. Also a table showing the amount of storm, combined and sanitary sewers in each of several groups of these cities, the grouping having been made in accordance with the population. These data were compiled from the United States Census reports, that for 1907 having just been published. The figures for 1909 have not yet been collected and probably will not be available for nearly two years to come.

These statistics show that in cities of over 30,000 population in this country there were, two years ago, 5,743 miles of combined and storm sewers and 4,563 miles of sanitary sewers. If we assume a cost of $5 per lineal foot for the former and $1.50 per lineal foot for the latter (both of which are, we believe, quite conservative estimates) we have a total cost of the former of $152,000,000 and the latter of $36,000,000; or of the two combined a cost of $188,000,000. While it is probable that of cities having less than 30,000 population and more than 10,000 there are a considerable number which have no sewerage system, still the number of those which have is very considerable, probably at least 500; and if these average 4 miles of sewer each, the value of sewers in them would approximate $15,000,000, making a total of $203,000,000. It is probable that pumping stations and sewage disposal plants would bring the total cost up to at least $215,000,000; and that construction during the past two years would raise the total to at least $250,000,000.

An examination of the data from which the table for 1907 was compiled gives some interesting comparative information. Examination to determine what percentage of cities were sewered on the combined and what on the separate system in each of the several classifications of cities showed that in class No. 1 (those having a population of over 300,000) all were sewered on the combined system wholly or partly, except New Orleans. Of these 15 cities, however, 6 have portions of their territory sewered on the separate system, with separate storm sewers as well as sanitary sewers.

The second class of cities, those having a population of 100,000 to 300,000, are 29 in number. All of these are sewered wholly or partly on the combined system, excepting Los Angeles, Cal., Memphis, Tenn., and Richmond, Va.; nine having also sanitary sewers and storm sewers. Two of the three have sanitary sewers only and one has both sanitary and storm sewers.

The third group contains cities having a population of between 50,000 and 100,000, and numbers 47. Of these 36 are sewered wholly or partly on the combined system; 9 of these having also sanitary and storm sewers, and 4 having also storm sewers but no sanitary sewers. Of the remaining 11, 9 have both sanitary and storm sewers and 2 have sanitary sewers only.

Group 4 includes cities having populations between 30,000 and 50,000, of which there are 66. (Atlantic City is not included by the Census Bureau, as its sewers are owned and operated by a private company.) Of these 66 cities, 41 have combined systems of sewerage; 6 of these having also both sanitary and storm sewers, 5 having also sanitary sewers only and 2 having

also storm sewers only. Of the remaining 25, 24 have both sanitary and storm sewers and one has sanitary sewers only.

Of the 158 cities larger than 30,000 population there is not one which is not provided to some degree with sanitary sewerage.

There are some apparent inconsistencies in the figures of the Census reports used in preparing this table, which would indicate either failure of the bureau to make clear in the information blanks just what was wanted or lack of care in making replies. In a number of cities the mileage of sewers is reported as having decreased between successive reports, which is improbable. It is possible that Minneapolis may be a typical case. The Census reports show this city as having 92.9 miles of "tile" sewers in 1905 and 80.5 miles in 1907. Sewer Engineer Ilstrup informs us that in 1905 there were 60.5 miles of vitrified clay and 32.4 miles of cement pipe, both reported as "tile." The 80.5 miles reported as tile in 1907 were all vitrified clay. The use of the word "tile" by the Census Bureau seems to us unfortunate; "vitrified clay" would leave no doubt as to what should be reported. Also, it would seem desirable to add concrete as a sewer material; possibly, however, combining it with brick and stone, since these are combined in many cases, grouping all under the head of "Concrete, brick or other masonry."

Another probable cause of error was confusion of figures, illustrated by Charleston, S. C. In 1905 there were reported for that city 41.4 miles of tile sewer. This, very properly, we think, did not include a length of 3.94 miles of sewer which had been built in 1895 and abandoned. There were no additions to the system between 1905 and 1907; but in some way this 3.94 miles of abandoned sewer appeared as 39.4 miles of tile sewer in the latter report.

Considering that the Census Bureau occupies two years in collecting, compiling and printing these data—not a "hurry job" by any means—it would seem possible for them to themselves discover these inconsistencies and correct them.

Sewage Purification

That the larger percentage of sewage purification plants are in the smaller cities is generally known, but we doubt whether many appreciate to what extent this is the case. As to what number of municipal purification plants there may be at the present time, we believe no one has anything like definite information. It is the hope of a committee of the American Society of Municipal Improvements to collect such information during the coming year. It is probable, however, that these number somewhere in the neighborhood of 200.

Of the 158 cities having more than 30,000 population, however, only 17 were provided with sewage purification plants in 1907, according to the Census Reports. Of these 17, only 2 are in the cities of the first group, one of these being Brooklyn, with a number of plants serving some of the suburban wards; the other, St. Louis, which treats a small part of its sewage in septic tanks. In cities of between 100,000 and 300,000 population there are five which purify more or less of their sewage, one of these using septic tanks, one chemical precipitation, one sand filtration, one a combination of chemical precipation and filtration, and the fifth a combination of septic tanks and filtration. Two of these five treat only a small portion of the sewage. Of the 47 cities of from 50,000 to 100,000, only three treat the sewage; two of these using sand filters, and the third a coke filter. Of the 67 cities having between 30,000 and 50,000 population, seven purify the sewage, two of these using septic tanks alone, three sand filtration alone, one septic tanks combined with filtration and one septic and precipitation tanks.

Sewer Flushing

The statistics show that practically all of the cities flush the sewers in one way or another; there being but 17 which reported that they did no flushing, and only 3 which did not report on the subject at all. Of the 138 which reported flushing, 30 report using automatic flush tanks solely, 78 using fire hydrants or some other method of supplying water by fire hose and 27 report using both methods. One reports using a portable flushing apparatus and one using flush valves in manholes or tanks.

House Connections

Assuming that all house connections were made with either sanitary or combined sewers, and that the two would never be duplicated in the same street—both of which hypotheses would seem to be pretty safe—we find that in the cities of the first class, from which the necessary data were furnished, the house connections per mile of sewer number 168.6; in cities of the second class, 131.2; in cities of the third class, 106.7; and in cities of the fourth class, 90.3.

In connection with these figures it is interesting to note the lack of statistics concerning house connections in many cities. Of the 15 largest cities, 2 reported that they did not know the number of house connections; 6 estimated the number; and of the remaining 7, one looked suspiciously like an estimate, as it was stated in round numbers. In cities of the second group, 2 reported ignorance of the number of house connections, 15 estimated them, and of the remaining 12, 3 looked very much like estimates for the reason stated above. In cities of the third group, 6 reported ignorance of the number of house connections, 21 estimated the number and of the remaining 20, 4 had the appearance of estimates. Of cities of the third group, 15 reported that the number of house connections were unknown, 20 estimated the number, and of the remaining 31, 8 appeared to be estimated. If we include as correct those which appeared to be estimated, but were not so reported, we have the following percentages of the total number of cities in each group as having definite knowledge of the number of house connections: Group No. 1, 46⅔ per cent; group No. 2, 41½ per cent; group No. 3, 42½ per cent; group No. 4, 47 per cent. There seems to be a remarkable uniformity among these several groups, and if this should continue down the list of cities smaller than 30,000 population, it would appear that only from 40 to 50 per cent of the cities of the country have any complete records of the number of house connections. In estimating the number of house connections per mile of sewer, the figures for which are given above, the numbers which were given as estimated, as well as those which were given as exact, were used. Other cities were not included in the calculation.

Mileage and Population

Dividing the total population in the cities of each group by the total mileage of sanitary and combined sewers in such cities, we find an approximate average relation between the mileage and population in the cities of each group. This, of course, does not give the population along each mile of sewer, but merely a ratio between total population and total mileage of sewers which carry sanitary sewage. These ratios of population to sewer mileage are as follows: Group No. 1, 1,322 per mile; group No. 2, 932 per mile; group No. 3, 880 per mile; group No. 4, 816 per mile. The gradual decrease in population per mile of sewer is accounted for by the decrease in average density of population as the size of the city grows smaller. The uniformity in such decrease, as indicated by the above figures, is greater than we would have expected, considering how many other factors enter into this ratio, such as percentage of population not upon any sewer line and outfall sewers where there is little population.

Pumping of Sewage

Quite a number of cities find it necessary to pump more or less of their sewage. These include: New York, Chicago, Boston, Buffalo, San Francisco, Detroit, Milwaukee, New Orleans, Washington, D. C.; Newark, N. J.; St. Paul Minn.; Providence, R. I.; Worcester, Mass.; Memphis, Tenn.; Dayton, O.; Cambridge, Mass.; Hartford, Conn.; Reading, Pa.; Somerville, Mass.; Duluth, Minn.; Norfolk, Va.; Houston, Tex.; Charleston, S. C.; Brockton, Mass.; Sioux City, Ia. (when the river is high); East St. Louis, Ill.; Salem, Mass.; Newton, Mass.; Jacksonville, Fla.; Woonsocket, R. I.; Sacramento, Cal.; Everett, Mass. Of these, all the sewage is pumped in New Orleans, Cambridge, Reading, Somerville, Houston, Brockton, Woonsocket, Sacramento and Everett; between 50 and 100 per cent is pumped in Boston, Washington, Providence, Norfolk and Salem; and less than 50 per cent in the remainder.

LENGTH OF SEWERS. MILES

City	ALL KINDS					BRICK					TILE				
	Total			Gain Between		Total			Gain Between		Total			Gain Between	
	1907	1905	1903	'05 and '07	'03 and '05	1907	1905	1903	'05 and '07	'03 and '05	1907	1905	1903	'05 and '07	'03 and '05
New York, N. Y.	1,834.2	1,752.7	1,517.2	81.5	235.5	640.9	585.8	[2]	55.1	....	1,186.4	1,164.8	[2]	21.6	....
Chicago, Ill.	1,724.2	1,633.0	1,563.1	91.2	69.9	609.0	583.0	567.5	26.0	15.5	1,115.2	1,050.0	995.6	65.2	54.4
Philadelphia, Pa.	[1]1,103.4	[1]1,041.2	[1]979.1	62.2	62.1	882.7	[1]833.0	[1]832.2	49.7	0.8	220.7	[1]208.2	[1]146.9	12.5	61.3
St. Louis, Mo.	639.2	609.2	549.0	30.0	60.2	257.0	261.5	238.9	−4.5	22.6	368.4	345.7	297.0	22.7	48.7
Boston, Mass.	729.3	700.6	622.6	28.7	78.0	90.2	[4]	196.0	....	−105.8[3]	623.5	[4]	414.0	....	[3]209.5
Baltimore, Md.	62.3	46.6	43.8	15.7	2.8	28.7	28.6	28.6	0.1	0.0	12.0	.....	5.6	.....	[3]6.4
Pittsburg, Pa.	511.9	[7]477.2	[7]445.4	34.7	31.8	77.7	75.5	73.1	2.2	2.4	433.2	401.3	371.9	31.9	29.4
Cleveland, Ohio.	447.7	412.7	349.1	35.0	63.6	286.8	269.8	259.1	17.0	10 7	146.8	136.3	84.2	10.5	52.1
Buffalo, N. Y.	502.2	489.0	441.4	13.2	47.6	162.0	160.6	143.7	1.4	16.9	332.2	320.5	296.2	11.7	24,3
San Francisco, Cal.	351.4	332.8	323.4	18.6	9.4	113.0	113.0	112.0	0.0	1.0	234.0	18.8	18.8	215.2	0.0
Detroit, Mich.	596.3	561.7	527.1	34.6	34.6	186.4	180.9	173.2	5.5	7.7	409.9	380.8	353.9	29.1	26.9
Cincinnati, Ohio.	300.7	263.2	239.9	37.5	23.3	72.7	65.4	61.2	7.3	4.2	228.0	197.8	178.7	30.2	19.1
Milwaukee, Wis.	405.1	379.8	356.7	25.3	23.1	119.1	113.6	106.9	5.5	6.7	286.0	266.2	249.8	19.8	16.4
New Orleans, La.	420.0	350.0	30.0	70.0	320.0	24.0	24.0	1.0	0.0	23.0	312.0	242.0	28.0	70.0	214.0
Washington, D. C.	521.2	484.4	456.8	36.8	27.6	86.6	109.1	99.1	−22.5	10.0	407.2	375.3	357.7	31.9	17.6
Newark, N. J.	253.3	232.4	201.2	20.9	31.2	75.0	70.4	67.1	4.6	3.3	178.3	162.0	134.1	16.3	27.9
Minneapolis, Minn.	224.8	200.4	179.9	24.4	20.5	108.7	100.0	96.4	8.7	3.6	80.5	92.9	45.6	−12.4	47.3
Jersey City, N. J.	120.3	115.5	112.7	4.8	2.8	70.2	67.9	67.7	2.3	0.2	44.2	41.4	39.7	2.8	1.7
Louisville, Ky.	117.0	122.1	107.2	−5.1	14.9	57.3	57.3	56.6	0.0	0.7	59.7	64.8	50.6	−5.1	14.2
Indianapolis, Ind.	184.3	162.1	146.1	22.2	16.0	100.4	89.3	81.2	11.1	8.1	83.9	72.8	64.9	11.1	7.9
St. Paul, Minn.	233.5	210.2	193.9	23.3	16.3	33.5	33.0	32.3	0.5	0.7	158.2	154.7	140.4	3.5	14.3
Providence, R. I.	219.2	213.3	203.8	5.9	9.5	75.2	73.4	[5]69.2	1.8	4.2	144.0	139.9	134.6	4.1	5.1
Rochester, N. Y.	253.7	241.3	233.9	12.4	7.4	24.7	23.1	21.7	1.6	1.4	153.9	143.1	137.0	10.8	6.3
Kansas City, Mo.	314.2	282.0	230.9	32.2	51.1	73.7	66.2	58.0	7.5	8.2	239.1	215.8	172.9	23.3	42.9
Toledo, Ohio.	211.9	191.6	181.4	20.3	10.2	144.3	135.6	131.9	8.7	3.7	65.8	55.9	49.4	9.9	6.5
Denver, Colo.	364.9	307.8	271.2	57.1	36.6	28.6	54.3	23.3	−25.7	31.0	336.3	253.5	247.9	82.8	5.6
Columbus, Ohio.	187.7	168.2	152.1	19.5	16.1	75.4	74.6	69.4	0.8	5.2	108.9	93.6	82.7	15.3	10.9
Los Angeles, Cal.	304.0	203.9	182.3	100.1	21.6	23.0	13.8	8.0	9.2	5.8	273.2	190.1	174.3	83.1	15.8
Worcester, Mass.	183.0	176.8	170.4	6.2	6.4	43.0	43.0	35.9	0.0	7.1	135.3	129.3	130.6	6.0	−1.3
Seattle, Wash.	193.7	138.6	93.9	55.1	44.7	9.7	8.1	1.0	1.6	7.1	182.0	127.3	92.9	54.7	34.4
Memphis, Tenn.	249.9	221.0	187.0	28.9	34.0	1.4	1.4	1.4	0.0	0.0	248.5	219.6	185.6	28.9	34.0
Omaha, Neb.	171.8	158.8	136.3	13.0	22.5	40.0	36.0	31.2	4.0	4.8	131.8	122.8	105.1	9.0	17.7
New Haven, Conn.	111.3	105.4	101.7	5.9	3.7	39.3	41.4	41.0	−2.1	0.4	60.3	48.6	60.7	11.7	−12.1
Scranton, Pa.	101.0	95.0	73.6	6.0	21.4	6.2	5.7	4.2	0.5	1.5	94.8	89.3	69.4	5.5	19.9
Syracuse, N. Y.	145.7	118.2	102.6	27.5	15.6	33.8	31.0	28.0	2.8	3.0	108.9	73.2	74.6	35.7	−1.4
St. Joseph, Mo.	76.4	54.4	59.7	22.0	−5.3	0.4	0.4	9.7	0.0	−9.3	76.0	54.0	49.4	22.0	4.1
Paterson, N. J.	83.0	80.0	76.0	3.0	4.0	15.0	15.0	20.0	0.0	−5.0	68.0	65.0	56.0	3.0	9.0
Portland, Ore.	181.0	141.3	119.7	39.7	21.6	13.5	16.2	13.5	−2.7	2.7	167.5	124.7	105.8	42.8	18.9
Atlanta, Ga.	139.1	122.4	106.2	16.7	16.2	18.5	16.2	15.2	2.3	10.0	120.6	106.2	91.0	14.4	15.2
Richmond, Va.	100.0	85.0	.....	15.0	.....	.....	[4]	.....	.....	.....	.....	[4]	.....	.....	.....
Fall River, Mass.	68.8	65.9	61.8	2.9	4.1	20.4	20.4	19.7	0.0	0.7	46.5	44.2	40.8	2.3	3.4
Nashville, Tenn.	89.2	79.3	67.2	9.9	12.1	26.7	23.9	20.3	2.8	3.6	58.4	51.3	42.8	7.1	8.5
Dayton, Ohio.	203.0	[1]179.0	135.8	24.0	43.2	39.0	[1]39.0	21.0	0.0	18.0	151.0	[1]129.0	113.6	22.0	15.4
Grand Rapids, Mich.	167.7	150.9	143.5	16.8	7.4	22.1	23.5	23.1	−1.4	0.4	136.2	122.0	118.1	14.2	3.9
Cambridge, Mass.	135.8	130.7	123.4	5.1	7.3	48.6	71.8	70.8	−23.2	1.0	80.7	53.8	47.5	26.9	6.3
Albany, N. Y.	98.6	96.4	95.1	2.2	1.3	17.1	17.1	17.7	0.0	−0.6	53.2	48.1	50.3	5.1	−2.2
Hartford, Conn.	115.3	107.1	104.3	8.2	2.8	55.6	54.1	52.7	1.5	1.4	54.8	50.1	50.4	4.7	−0.3
Lowell, Mass.	104.1	95.6	90.1	8.5	5.5	32.0	13.7	30.1	18.3	−16.4	69.1	78.9	57.0	−9.8	21.9
Reading, Pa.	115.8	48.2	37.9	67.6	10.3	.....	.....	2.0	.....	−0.2	115.8	48.2	31.0	67.6	17.2
Trenton, N. J.	70.2	64.9	52.4	5.3	12.5	16.2	13.6	13.0	2.6	0.6	44.6	45.9	29.5	−1.3	16.4
Bridgeport, Conn.	89.1	77.0	74.5	12.1	2.5	7.0	6.4	5.9	0.6	0.5	82.1	70.6	68.6	11.5	20.5
Wilmington, Del.	85.0	77.4	73.6	7.6	3.8	15.1	14.1	[2]	1.0	.....	65.9	60.3	[2]	5.6	.....
Camden, N. J.	66.5	60.5	56.4	6.0	4.1	66.5	59.5	55.4	7.0	4.1	.....	1.0	1.0	[6]	0.0
Des Moines, Ia.	123.1	87.6	77.1	35.5	10.5	31.6	31.6	23.3	0.0	8.3	90.5	55.2	53.8	35.3	1.4
Kansas City, Kan.	60.0	52.9	50.4	7.1	2.5	16.5	16.5	16.5	0.0	0.0	43.5	36.4	33.9	7.1	2.5
Lynn, Mass.	76.5	72.2	63.3	4.3	8.9	14.2	14.2	11.9	0.0	2.3	61.6	57.3	50.7	4.3	6.6
New Bedford, Mass.	77.2	72.5	70.4	4.7	2.1	18.7	18.7	18.6	0.0	0.1	58.5	53.8	51.8	4.7	2.0
Springfield, Mass.	110.8	105.0	100.6	5.8	4.4	27.2	27.2	24.8	0.0	2.4	81.9	51.7	73.5	30.2	−21.8
Troy, N. Y.	52.9	52.2	50.3	0.7	1.9	31.3	31.2	30.9	0.1	0.3	21.6	21.0	19.4	0.6	1.6
Oakland, Cal.	251.7	209.8	190.3	41.9	19.5	3.2	1.0	....	2.2	....	239.8	206.8	185.3	33.0	21.5
Lawrence, Miss.	64.3	60.0	59.6	4.3	0.4	19.8	20.0	19.9	−0.2	0.1	44.2	40.0	39.7	4.2	0.3
Somerville, Mass.	97.1	86.4	77.4	10.7	9.0	31.0	28.9	[2]	2.1	.....	65.2	....	[2]	....	....
Savannah, Ga.	74.9	74.4	72.9	0.5	1.5	2.3	12.6	12.6	−10.3	0.0	72.6	61.8	60.3	10.8	1.5
Duluth, Minn.	81.2	72.0	68.4	9.2	3.6	8.3	8.3	9.5	0.0	−1.2	72.2	63.3	57.2	8.9	6.1
Norfolk, Va.	68.3	60.7	50.9	7.6	9.8	....	....	....	....	.....	68.3	60.7	50.9	7.6	9.8
Hoboken, N. J.	15.0	[1]15.0	14.0	0.0	1.0	12.0	[1]13.0	12.0	−1.0	1.0	....	....	....	....	....
Peoria, Ill.	84.3	84.2	76.5	0.1	7.7	21.6	21.5	20.8	0.1	0.7	62.7	....	55.7	....	[3]7.0
Yonkers, N.Y.	46.0	43.8	40.7	2.2	3.1	11.5	11.6	[2]	−0.1	.....	33.1	30.8	[2]	2.3	....
Utica, N. Y.	86.5	79.5	78.4	7.0	1.1	14.3	13.0	12.5	1.3	0.5	37.3	32.6	31.1	4.7	1.5
Manchester, N. H.	81.6	78.5	74.8	3.1	3.7	8.8	8.8	8.9	0.0	−0.1	67.0	63.2	60.0	3.8	3.2
Schenectady, N. Y.	89.3	59.8	57.9	29.5	1.9	....	....	0.1	....	.....	89.1	59.8	57.8	29.3	2.0
Evansville, Ind.	32.6	[1]28.0	24.0	4.6	4.0	11.3	[1]11.0	10.0	0.3	1.0	21.3	[1]17.0	14.0	4.3	3.0
San Antonio, Tex.	96.0	85.2	85.9	10.8	−0.7	7.9	[4]	10.0	....	−2.1[3]	76.1	[4]	75.9	....	[3]0.2
Elizabeth, N. J.	66.9	63.9	62.7	3.0	1.2	13.3	13.3	13.3	0.0	0.0	53.6	50.6	49.4	3.0	1.2
Waterbury, Conn.	51.4	47.1	37.8	4.3	9.3	4.2	4.6	4.5	−0.4	0.1	44.9	42.1	32.9	2.8	9.2
Salt Lake City, Utah.	78.0	56.0	54.3	22.0	1.7	6.9	6.8	8.8	0.1	−2.0	67.6	49.1	45.5	18.5	3.6
Wilkes-Barre, Pa.	107.5	69.4	66.3	38.1	3.1	3.3	3.2	2.1	0.1	1.1	104.2	66.2	64.2	38.0	2.0
Erie, Pa.	79.4	67.2	62.2	12.2	5.0	11.4	11.4	11.4	0.0	0.0	66.8	54.6	50.1	12.2	4.5
Houston, Texas.	53.0	47.0	37.4	6.0	9.6	13.0	....	3.6	....	[3]9.4	40.0	47.0	31.7	−7.0	15.3
Tacoma, Wash.	149.1	110.1	82.1	39.0	28.0	0.3	14.6	0.3	−14.3	14.3	148.6	95.5	81.8	53.1	13.7
Harrisburg, Pa.	58.6	49.9	40.7	8.7	9.2	19.8	[4]	19.6	....	[3]0.2	29.5	[4]	21.1	....	[3]8.4
Charleston, S. C.	62.9	64.9	54.6	−2.0	10.3	23.5	23.5	23.5	0.0	0.0	39.4	41.4	31.1	−2.0	10.3
Portland, Me.	66.9	63.6	59.9	3.3	3.7	16.3	15.8	15.6	0.5	0.2	48.1	44.9	41.4	3.2	3.5
Youngstown, Ohio.	76.6	60.5	46.3	16.1	14.2	14.9	14.0	18.0	0.9	−4.0	61.7	46.5	28.3	5.2	18.2
Dallas, Texas.	123.2	90.2	76.5	33.0	13.7	4.0	2.3	3.6	1.7	−1.3	118.6	87.9	72.9	30.7	15.0
Terre Haute, Ind.	53.4	49.6	42.6	3.8	7.0	8.6	8.0	8.0	0.6	0.0	44.8	41.6	34.6	3.2	7.0
Fort Wayne, Ind.	84.2	80.5	71.4	3.7	9.1	21.3	20.9	20.8	0.4	0.1	62.9	59.6	50.6	3.3	9.0
Akron, Ohio.	98.1	85.6	81.3	12.5	4.3	8.6	6.1	5.7	2.5	0.4	86.8	76.8	72.9	10.0	3,9
Holyoke, Mass.	39.2	36.7	32.9	2.5	3.8	12.6	13.0	13.0	−0.4	0.0	24.5	22.1	18.3	2.4	3.8
Brockton, Mass.	73.1	52.0	32.6	21.1	19.4	5.0	5.0	3.0	0.0	2.0	66.3	46.8	29.6	19.5	17.2
Covington, Ky.	34.6	31.2	26.8	3.4	4.4	[1]1.5	[2]	....	....	....	[3]31.0	31.2	[2]	−0.2	....
Saginaw, Mich.	86.9	74.0	70.4	12.9	3.6	30.0	23.0	20.7	7.0	2.3	56.8	50.8	49.6	6.0	1.2
Lincoln, Neb.	55.6	53.4	46.4	2.2	7.0	2.8	3.2	3.2	−0.4	0.0	52.3	50.2	43.2	2.1	7.0
Altoona, Pa.	69.4	58.5	52.3	10.9	6.2	10.7	13.7	13.7	−3.0	0.0	57.6	44.6	38.6	13.0	6.0
Spokane, Wash.	36.0	23.0	27.8	13.0	−4.8	....	....	....	....	.....	36.0	23.0	27.8	13.0	−4,8
Lancaster, Pa.	35.0	35.0	30.0	0.0	5.0	7.2	7.2	10.0	0.0	−2.8	27.0	27.0	20.0	0.0	7.0
Birmingham, Ala.	85.3	77.4	72.9	7.9	4.5	18.5	18.2	18.2	0.3	0.0	66.8	59.2	54.7	7.6	4.5
Bayonne, N. J.	29.6	28.0	28.0	1.6	0.0	7.0	7.0	10.0	0.0	−3.0	21.6	20.0	17.0	1.6	3.0
South Bend, Ind.	56.1	48.2	35.6	7.9	12.6	12.0	12.0	10.9	0.0	1.1	43.0	35.6	24.7	7.4	10.9
Butte, Mont.	31.1	27.9	22.2	3.2	5.7	2.1	1.9	....	0.2	.....	0.2	26.0	19.7	−25.8	6.3
Pawtucket, R. I.	53.4	51.1	48.7	2.3	2.4	8.0	7.8	7.7	0.2	0.1	44.2	43.1	41.0	1.1	2.1
McKeesport, Pa.	33.1	32.5	30.9	0.6	1.6	4.4	5.0	4.4	−0.6	0.6	28.7	27.5	26.5	1.2	1.0
Binghamton, N. Y.	44.6	40.2	40.3	4.4	−0.1	9.0	8.7	8.5	0.3	0.2	35.5	31.5	31.5	4.0	0.0
Johnstown, Pa.	33.4	30.3	27.7	3.1	2.6	0.9	0.9	1.6	0.0	−0.7	32.5	....	26.1	....	....
Dubuque, Ia.	40.9	36.1	33.5	4.8	2.6	1.4	1.1	1.1	0.3	0.0	27.6	29.5	26.9	−1.9	2.6

LENGTH OF SEWERS. MILES—Continued

City	ALL KINDS					BRICK					TILE				
	TOTAL			GAIN BETWEEN		TOTAL			GAIN BETWEEN		TOTAL			GAIN BETWEEN	
	1907	1905	1903	'05 and '07	'03 and '05	1907	1905	1903	'05 and '07	'03 and '05	1907	1905	1903	'05 and '07	'03 and '05
Sioux City, Ia.	62.8	58.7	55.1	4.1	3.6	4.6	4.6	4.2	0.0	0.4	57.1	54.0	50.8	3.1	3.2
Augusta, Ga.	60.7	56.8	50.1	3.9	6.7	23.0	22.4	21.7	0.6	0.7	37.7	34.4	28.4	3.3	6.0
Mobile, Ala.	87.5	80.3	76.3	7.2	4.0	0.3	0.3	0.3	0.0	0.0	86.6	79.6	75.6	7.0	4.0
Topeka, Kan.	74.4	73.0	59.6	1.4	13.4	5.9	5.9	4.9	0.0	1.0	68.5	67.1	54.7	1.4	12.4
Springfield, Ohio.	16.0	12.9	12.4	3.1	0.5	2.9	2.9	2.9	0.0	0.0	13.1	10.0	9.5	3.1	0.5
Allentown, Pa.	11.2	9.2	6.1	2.0	3.1	5.4	5.1	3.7	0.3	1.4	5.8	....	2.4	....	....
East St. Louis, Ill.	45.0	38.8	22.7	6.2	16.1	0.5	0.4	0.5	0.1	−0.1	44.3	38.4	22.2	5.9	16.2
Wheeling, W. Va.	43.2	41.5	41.6	1.7	0.1	2.9	7.0	3.5	−4.1	3.5	40.3	34.5	38.1	5.8	−3.6
Montgomery, Ala.	122.5	90.9	82.9	31.6	8.0	41.4	26.5	22.1	14.9	4.4	81.1	64.4	39.0	16.7	25.4
Passaic, N. J.	42.1	37.6	36.1	4.5	1.5	0.9	0.9	1.0	0.0	−0.1	41.2	36.7	35.1	4.5	1.6
Davenport, Ia.	69.7	51.9	46.4	17.8	5.5	3.7	4.3	3.7	−0.6	0.6	61.4	....	42.1	....	19.3
Atlantic City, N. J.	[5]	28.0	44.0	....	....	....	....	....	....	.....	....	28.0	38.0	....	−10.0
Little Rock, Ark.	56.7	46.0	28.0	10.7	18.0	1.0	....	....	....	.....	54.7	46.0	28.0	8.7	18.0
Bay City, Mich.	79.6	67.8	66.2	11.8	1.6	18.1	18.5	13.0	−0.4	5.5	61.5	49.3	48.4	12.2	0.9
York, Pa.	[6]44.0	19.0	19.0	25.0	0.0	1.0	0.3	0.3	0.7	0.0	43.0	18.7	18.7	24.3	0.0
Malden, Mass.	70.0	68.2	46.4	1.8	21.8	1.1	1.1	1.9	0.0	−0.8	58.9	57.1	44.5	1.8	12.6
Springfield, Ill.	60.3	60.0	57.8	0.3	2.2	37.8	46.5	44.7	−8.7	1.8	22.5	13.5	13.1	9.0	0.4
Quincy, Ill.	32.0	26.8	26.8	5.2	0.0	6.1	5.8	5.8	0.3	0.0	25.9	21.0	21.0	4.9	0.0
Canton, Ohio.	77.6	77.0	33.7	0.6	43.3	8.1	8.3	0.6	−0.2	7.7	69.5	68.7	33.1	0.8	35.6
Superior, Wis.	51.2	51.0	49.0	0.2	2.0	20.8	20.8	0.0	0.0	0.0	30.1	29.9	27.9	0.2	2.0
Chester, Pa.	31.0	30.0	31.7	1.0	−1.7	22.0	22.0	26.7	0.0	−4.7	9.0	8.0	5.0	1.0	3.0
Chelsea, Mass.	37.3	36.8	35.0	0.5	1.8	....	....	[2]	....	.....	37.3	35.0	[2]	2.3	....
South Omaha, Neb.	11.2	10.0	10.0	1.2	0.0	....	....	....	....	.....	11.2	10.0	10.0	1.2	0.0
Newcastle, Pa.	56.5	51.2	48.6	5.3	2.6	50.5	7.7	1.1	42.8	6.6	5.0	43.5	45.0	−38.5	−1.5
Salem, Mass.	41.7	42.3	40.8	−0.6	1.5	2.8	1.5	1.0	1.3	0.5	29.0	35.8	35.8	−6.8	0.0
Newton, Mass.	158.7	100.6	96.0	58.1	4.6	16.8	13.6	13.4	3.2	0.2	134.1	87.0	82.6	47.1	4.4
Haverhill, Mass.	42.6	42.1	40.6	0.5	1.5	7.7	7.7	7.7	0.0	0.0	34.5	34.0	32.7	0.5	1.3
Jacksonville, Fla.	66.2	54.5	49.6	11.7	4.9	6.2	6.4	5.1	−0.2	1.3	55.0	48.1	44.5	6.9	3.6
Joplin, Mo.	29.3	22.8	20.0	6.0	2.8	....	....	....	....	.....	29.3	22.8	20.0	6.5	2.8
Wichita, Kan.	67.1	70.0	68.0	−2.9	2.0	2.9	2.9	2.9	0.0	0.0	64.2	67.1	65.1	−2.9	2.0
Rockford, Ill.	49.7	44.0	31.5	5.7	12.5	....	....	....	....	.....	49.7	44.0	31.5	5.7	12.5
Knoxville, Tenn.	35.2	28.3	27.5	6.9	0.8	2.3	2.3	2.3	0.0	0.0	31.6	25.5	25.0	6.1	0.5
Elmira, N. Y.	45.8	41.5	38.5	4.3	3.0	5.8	[4]	6.4	....	−0.6[3]	40.0	[4]	26.1	....	[3]13.5
Galveston, Texas.	25.2	11.8	11.3	13.4	0.5	....	....	....	....	.....	16.8	....	11.3	....	[3]5.9
New Britain, Conn.	81.0	58.9	41.8	22.1	17.1	12.6	12.6	12.6	0.0	0.0	68.4	46.3	29.2	22.1	17.1
Chattanooga, Tenn.	50.7	39.8	37.4	10.9	2.4	10.4	9.6	9.6	0.8	0.0	40.3	30.2	27.8	10.1	2.4
Kalamazoo, Mich.	56.1	45.8	30.9	10.3	14.9	0.3	0.1	....	0.2	.....	53.3	45.2	30.1	8.1	15.1
Woonsocket, R. I.	22.9	17.0	13.1	5.9	3.9	1.0	1.0	1.0	0.0	0.0	21.9	16.0	12.0	5.9	4.0
Fitchburg, Mass.	38.1	36.0	34.1	2.1	1.9	4.6	4.4	4.4	0.2	0.0	33.5	31.6	29.7	1.9	1.9
Racine, Wis.	59.5	57.8	53.5	1.7	4.3	6.2	5.7	5.4	0.5	0.3	53.3	52.1	48.1	1.1	4.0
Auburn N. Y.	69.5	65.0	63.2	4.5	1.8	16.6	[4]	[2]	....	.....	49.6	[4]	[2]	....	....
Macon, Ga.	63.5	51.8	....	11.7	....	24.0	12.0	....	12.0	.....	39.5	39.8	....	−0.3	....
Joliet, Ill.	34.1	26.6	26.1	7.5	0.5	....	....	....	....	.....	32.2	21.1	21.1	11.1	0.0
Oklahoma City, Okla.	84.8	....	....	....	....	2.6	....	....	....	.....	77.8	....	....	....	....
Oshkosh, Wis.	70.0	67.0	60.5	3.0	....	....	....	....	....	.....	70.0	67.0	60.5	3.0	6.5
West Hoboken, N. J.	20.0	....	17.1	....	[3]2.9	6.0	....	4.5	....	[3]1.5	....	....	12.6	....	....
Sacramento, Cal.	50.4	42.0	34.3	8.4	7.7	7.1	6.5	6.5	0.6	0.0	42.7	35.5	27.3	7.2	8.2
Pueblo, Col.	80.7	111.1	57.3	−30.4	53.8	4.0	4.5	....	−0.5	.....	76.5	106.6	57.3	−30.1	49.3
Everett, Mass.	42.6	....	40.2	....	[3]2.4	3.5	....	3.4	....	[3]0.1	39.1	....	36.8	....	[3]2.3
Taunton, Mass.	27.8	25.7	23.8	2.1	1.9	9.1	8.9	8.4	0.2	0.5	18.7	16.8	15.4	1.9	1.4
Newport, Ky.	27.1	....	19.3	....	[3]7.8	2.7	....	2.5	....	[3]0.2	23.7	....	16.8	....	[3]6.9
La Crosse, Wis.	24.9	20.3	15.1	4.6	5.2	1.2	....	1.5	....	−0.3[3]	23.7	20.3	13.6	3.4	6.7
Fort Worth, Texas.	160.0	....	40.9	....	[3]119.1	....	....	2.0	....	.....	158.0	....	38.9	....	[3]119.1

[1] Estimated. [2] Not reprinted. [3] Between 1903 and 1907. [4] Not reported separately. [5] Sewers owned by private corporation. [6] Sewer system not yet in use. [7] Including Allegheny.

LENGTH AND CLASSES OF SEWERS, 1907

Cities Having Population of	Length (Miles) of Sewers							
	All Classes				Combined (Sanitary and Storm)			
	Total	Brick	Tile	All Other	Total	Brick	Tile	All Other
All cities.	22,866.4	6,122.3	15,941.4	802.7	17,122.8	5,427.8	11,245.2	449.0
More than 300,000.	10,149.1	3,636.8	6,315.5	196.8	9,242.3	3,424.0	5,716.3	102.8
100,000 to 300,000.	5,253.4	1,219.0	3,711.8	322.6	3,690.5	1,052.9	2,443.4	194.2
50,000 to 100,000.	3,905.8	738.1	3,012.0	155.7	2,627.1	656.1	1,853.0	118.0
30,000 to 50,000.	3,558.1	528.4	2,902.1	127.6	1,562.9	294.8	1,232.5	35.6

Cities Having Population of	Length (Miles) of Sewers								Number of House Connections
	Sanitary				Storm				
	Total	Brick	Tile	All Other	Total	Brick	Tile	All Other	
All cities.	4,563.2	350.0	4,024.8	188.4	1,180.4	344.5	671.4	164.5	2,580,572
More than 300,000.	554.8	88.4	459.5	6.9	352.0	124.4	139.7	87.9	1,465,210
100,000 to 300,000.	1,300.0	104.0	1,093.1	102.9	262.9	62.1	175.3	25.5	540,228
50,000 to 100,000.	1,097.1	50.2	1,019.6	27.3	181.6	31.8	139.4	10.4	344,996
30,000 to 50,000.	1,611.3	107.4	1,452.6	51.3	383.9	126.2	217.0	40.7	230,138

DAILY VOLUME OF SEWAGE (GALLONS) IN 1907

Cities Having Population of	Maximum	Minimum	Average
All cities.	1,963,183,844	1,144,756,383	1,445,350,109
More than 300,000.	1,013,686,757	589,415,620	724,188,106
100,000 to 300,000.	540,437,000	293,816,000	401,074,779
50,000 to 100,000.	202,475,800	142,650,900	167,909,066
30,000 to 50,000.	206,584,287	118,873,863	152,178,158

The figures in this table are very indefinite, as it is not stated whether they include storm water, or house sewage only. Moreover, a large majority of them were estimated only. They show a mean of all maximums 36 per cent greater than the mean of the averages; and almost exactly the same relation is found between the maximum and average for each group.

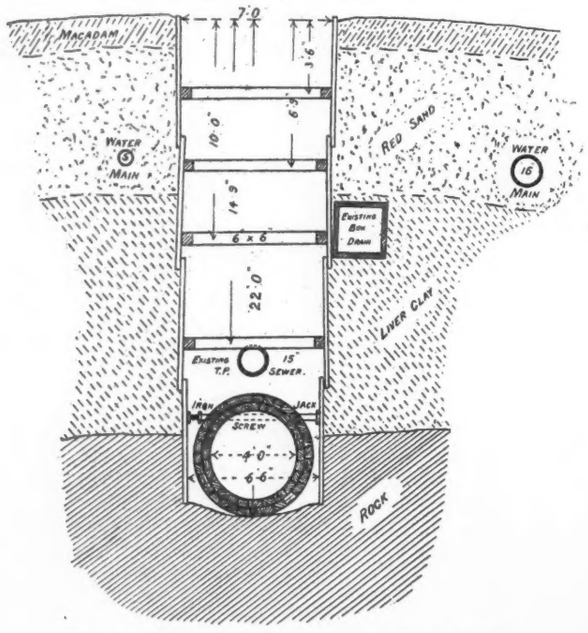
SEWER CONSTRUCTION IN OTTAWA

Building Brick Sewer Under Difficulties—Blasting Rock Under Running Sand—Handling Flow of Old Sewer in Same Trench—Cost of Work

SOME interesting work was rendered necessary by the construction in Ottawa, Canada, of a brick relief sewer, the purpose of which was to relieve a system of small vitrified clay pipe sewers and a 2 ft. 8 in. by 4 ft. brick sewer, which sewers were badly surcharged after every rainstorm. The relief sewer discharges into the Ottawa River, at which point construction was begun. All the work was done by the city by day labor.

From the river to the top of the bluff on which this part of the city rests the sewer consists of a steel pipe 24 inches in diameter, which was brought to the ground in six flanged sections and bolted together. The total length of this steel sewer was 146 feet 6 inches, and it was laid on a 70 per cent grade. The last two pipes were bedded at their common flange in a mass of concrete surrounding the flanges and resting on a rock foundation, the concrete mass being 7 feet 9 inches by 3 feet 9 inches. At the upper end of this pipe is a 6 by 6-foot inspection chamber.

From the inspection chamber the sewer is circular in section, 48 inches in diameter, with an 8-inch brick shell. At the upper end it reduces to a 24-inch vitrified clay pipe. The sewer was constructed in open cut throughout, and the trench was directly on the line of an old 15-inch pipe sewer.



CROSS-SECTION OF TRENCH SHOWING DIFFICULTIES

At first considerable difficulty was experienced in getting rid of the water from this old sewer, which it was necessary to do because the bottom of the excavation was in a rock bed, which required drilling. At first a 5-inch electrical centrifugal pump was used, but this proved expensive and difficult to move as the work progressed. After some experience with this, iron troughs were substituted, connecting the old 15-inch sewer with the outlet portion of the relief sewer as this was completed. These troughs served the purpose admirably, as they were light, not bulky, of sufficient carrying capacity and allowed the workmen perfect freedom to carry on their duties.

Very great care had to be taken in the bracing of the trench, which was close sheeted in two to four settings from the surface to the rock level. The material above the rock varied from red sand to hard pan and liver-clay; and in one section a bed of very troublesome running sand underlying the liver-clay. At the crossing of Wellington Street the difficulties were increased by the electric car line across the trench, on which service had to be maintained, as had also the ordinary vehicular and pedestrian traffic, which is fairly heavy at this point.

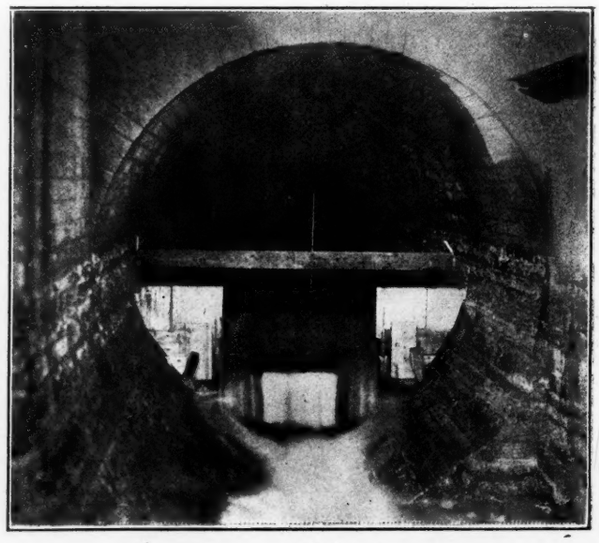
Work was carried on by two gangs, working day and night until the crossing was made. A 5-inch water main on one side, a 15-inch water main on the other, gas and Bell telephone cables and an old 30-inch box drain each contributed its share to the difficulty. This was still further increased by the necessity for blasting in the bottom of the trench, which was likely to produce a cave in along the whole line of the trench, which at this point was 22 feet deep; and, moreover, the proximity of a number of churches and other large and costly buildings added to the seriousness of the damage which might be caused by heavy blasting. Possibly the only favorable condition was that this part of the work was carried on in winter, and the liver-clay and running sand were rendered quite stable by freezing soon after they were reached in the excavation.

The excavated material was handled by a trenching machine, the traveler of which weighed about two tons and ran directly over the trench on rails having a 7-foot 6-inch gauge. The buckets handled by this traveler had a capacity of two-thirds of a cubic yard.

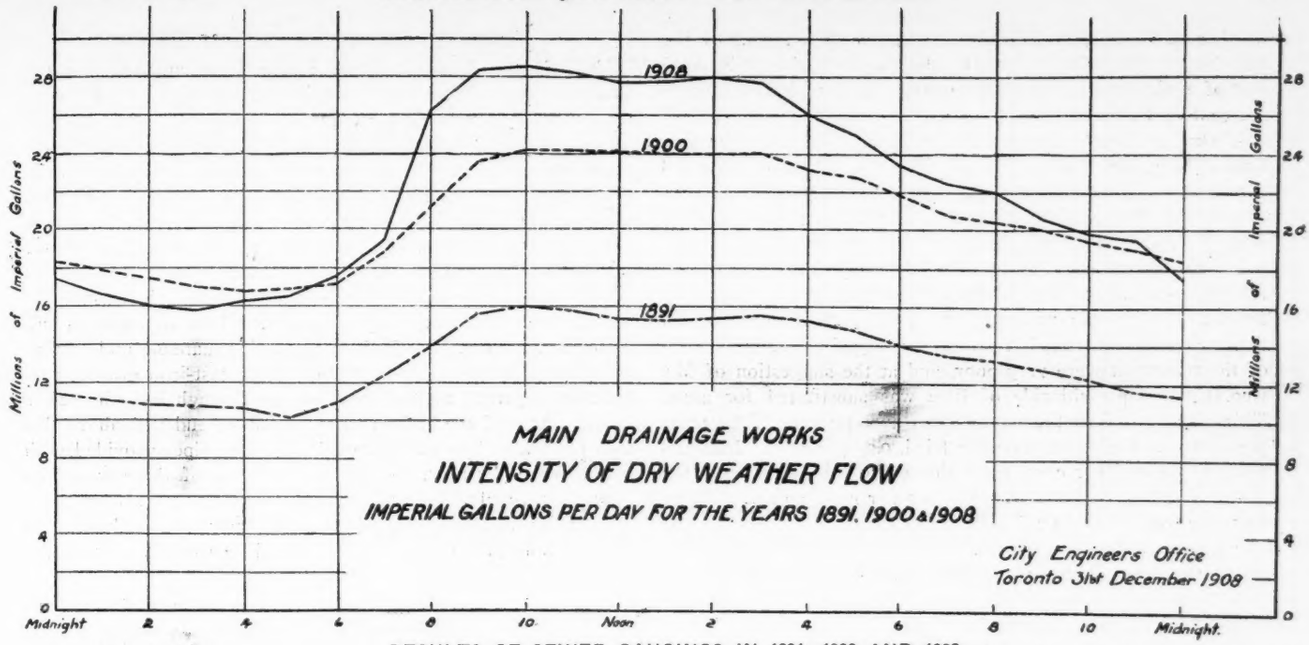
The cost of this 48-inch sewer was as follows: Brick work, $1.93; brick laying, $1.66; sand, 23 cents; cement, 72 cents; a total of $4.54 for the sewer proper. The total construction cost about $21 a foot; making the trenching, back filling, etc., cost about $16.50 per running foot.

GAUGING SEWER FLOW

IN connection with designing of sewers and of the sewage disposal plant for the city of Toronto, the engineering department has made a number of gaugings of the actual flow in the existing sewers. Gaugings were made in 1891 and again in 1900 and a third set of gaugings in 1908. The same methods were pursued in each of these three years. The apparatus employed is shown by the photograph, and consisted of a rectangular weir with end contractions, the height on which was read by a hook gauge attached to a cross beam firmly fixed in the sewer above the weir. These gaugings, compared with the estimated population contributing the sewage which reached the weir, gave a dry weather flow of about 75 gallons per capita in 1891; of 109 gallons in 1900, and of 73 gallons in 1908. City Engineer Rust believes that the high results obtained in 1900 were owing to the fact that gaugings were made at a time of year when considerable sub-soil water was reaching the sewer. Another indication of the same is that in the 1908 gaugings the fluctuation between midnight and noon flow was very much greater than in the 1900 gaugings; this indicating the presence of much less ground water, the flow of which would be constant day and night. The accompanying diagram shows the hourly fluctuations during each of the three gaugings.



WEIR FOR GAUGING SEWAGE, TORONTO



RESULTS OF SEWER GAUGINGS IN 1891, 1900 AND 1908

DISINFECTION OF WATER AND SEWAGE

Summary of Results Obtained from Experiments and Use of Various Disinfectants—Bleaching Powder Apparently Best for Sewage—Costs in Several Cities

IN a paper read December 3, before the New Jersey Sanitary Association, Mr. Clyde Potts summarized the knowledge to date concerning disinfection of water and sewage. While the paper made no pretence of presenting facts unknown to sanitary engineers, he collected practically all such information in the one comparatively brief paper which it seems worth while to abstract.

Both sewage and water require treatment for removing two distinct classes of impurities—infection and filth. The former term includes disease-causing micro-organisms; the latter, all other organic matter, whether in suspension or in solution. There are, of course, instances where some chemical constituents only must be removed to render water potable or unobjectionable for commercial purposes; but we believe there are no exceptions to the above statement so far as sewage is concerned.

Until a few years ago filtration was relied upon to remove both these objectionable impurities from water and sewage, and not until within the last two or three years have attempts been made in practice to treat infection and filth separately. There are some plants designed, constructed and operated with the greatest skill available which obtain very satisfactory removal of both infection and filth from water, although such removal is practically never complete. There are a number of cases, however, where it is desirable to treat sewage for filth with little attention to infection, or for infection with small regard for the filth. The latter, disinfection, was considered by the writer in this paper.

The disinfectants now being experimented with are ozone, chlorine and its compounds and copper and its compounds. The first is one of the best disinfecting agents known, but no method of producing it at a cost making it economically possible has yet been devised, although much is being done in that direction. Copper compounds have been used for a number of years for destroying algæ in reservoirs, but these are not as effective disinfectants as chlorine compounds, and the latter have received the most attention as agents for sewage disinfection, either in the form of hypochlorites or oxychlorides, or electrolytically decomposed chlorine from sodium chloride. In 1905 sodium hypochlorite was used at Lincoln, England, in the case of a typhoid epidemic accredited to the water supply, being used to sterilize the reservoir and also the filter beds by Dr. A. C. Houston and Mr. Geo. McGowan. In 1908 the Norwood Engineering Company, under the supervision of Mr. Geo. A. Johnson, constructed a mechanical filter plant for purifying, at the Chicago Stock Yards, the waters of a creek so highly polluted as to be practically sewage. This water was treated with lime, sulphate of iron and hypochlorite. The lime and sulphate of iron served as a coagulant, and the water was allowed to settle in tanks and was then filtered. At first copper sulphate was applied to the coagulated waters before they entered the filters. This gave a fairly satisfactory water, but the effluent contained high quantities of organic matter and a sewage taste and odor. Hypochlorite of lime was then tried, and was found to do away with the odor and taste and to entirely overcome any tendency of bacteria to propagate in the filtered effluent. During the final test of this plant it reduced the contained bacteria from a range of 225,000 to 1,390,000 in the raw water to from 1 to 55 in the filtered water. The cost of the entire purification was $15.66 per million gallons, exclusive of interest and depreciation.

During 1909 Messrs. Clark and Gage treated the Merrimac river with bleaching powder, and found that as little as one part per million of available chlorine was as effective in reducing bacteria as the best slow sand filters, but that 40 parts per 1,000,000 were insufficient to produce complete sterilization, although one-tenth as much gave a reduction of 99½ per cent. The water thus treated was also filtered through a rapid sand filter using sulphate of alumina, the disinfectant and coagulant being applied in conjunction. It was found that, in addition to the disinfection, the reduction of organic matter was increased from 41 per cent without the use of the disinfectant to 52 per cent when the disinfectant was used, this apparently supporting the theory that hypochlorites oxidize dead organic matter. When operated without the bleaching powder it had been necessary to use soda ash in connection with the alumina. The cost of treatment with soda ash had been $4.80 per million gallons, whereas when bleaching powder was substituted for this the cost was reduced to $2.84. From February to August, 1909, experiments were made in passing Merrimac river water through rough filters composed of 48 inches of sand, with an effective size of 0.45 m.m., and then disinfecting with a strong solution of bleach. When bleach the equivalent of 0.016 part of available chlorine was used 91 per cent of bacterial removal was obtained, but more than 60 per cent of the samples contained over 100 bacteria per c.c. The amount of bleach used was then doubled and the bacterial removal averaged about 81 per cent during March and April, 86 per cent in May and 91 per cent in June. The high percentage in June was due to an increase in the

number of bacteria in the raw water, but 14 per cent of the samples contained more than 100 bacteria. During July 0.046 part of available chlorine per 100,000 was used, and, producing 99 per cent of bacterial removal, no samples contained more than 100. During August the amount of bleach was somewhat less than in July, the average bacterial removal 96 per cent, and 8 per cent of the samples contained more than 100 bacteria. The cost during the last six months of this experiment varied from 8 to 13 cents per million gallons for disinfectant.

Poughkeepsie, N. Y., takes it water supply from the Hudson river and coagulates it with alum, and after sedimentation it is filtered. During the winter of 1908, when the water carried little suspended matter, but much sewage pollution, the results of the treatment were very poor, and at the suggestion of Mr. Geo. C. Whipple chloride of lime was substituted for alum. This was applied to the water at an average rate of 0.4 parts per million. Various rates were tried, 0.25 giving the bacterial removal of 90.8 per cent, from this up to 0.40 giving 97.3 per cent, from 0.40 to 0.50 averaging 99.1 per cent, and 0.50 giving 99.5 per cent. The total construction cost for applying the bleaching powder was $275, and the cost of the powder was about 14 or 15 cents per million gallons. No free chlorine remained in the filtrate, and no tastes or odors developed which can be noticed by the consumer.

The Baltimore County Water and Electric Company recently conducted experiments with a solution of hypochlorite of lime added to water which had previously been coagulated with alum and was afterward filtered through rapid sand filters. Practically sterile water was obtained by 0.1 grain per gallon, and it was found that equally good results could be obtained with even less amounts. In addition, it was found that a marked saving of alum could be effected. Also the amount of wash water was reduced to about 40 per cent of what had formerly been required, and the time between cleanings extended from 24 to 30 hours.

The experiments at Boonton, N. J., of the Jersey City Water Supply Company were so fully described in our issue of July 7 that it is unnecessary to more than refer to them in this abstract.

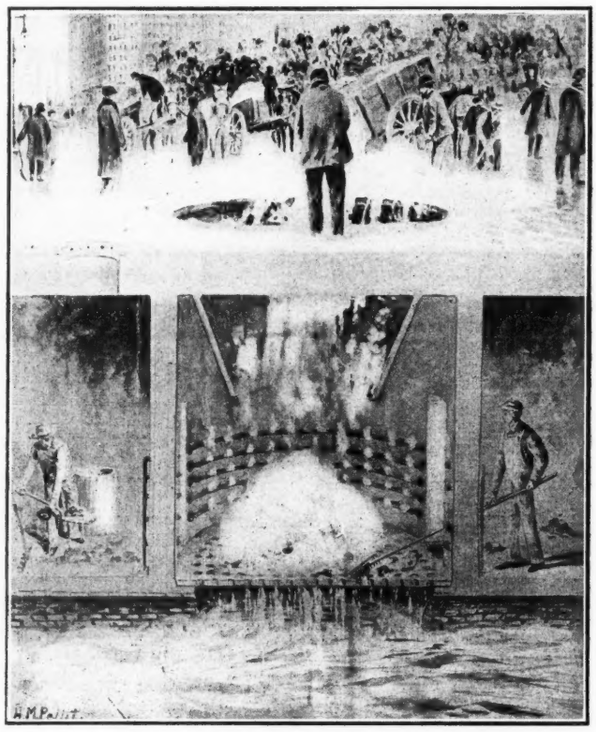
"As applied to sewage, the most notable examples in this country of the use of hypochlorites as a disinfectant was found at Brewster, N. Y.; Redbank, N. J.; Boston, Mass., and Baltimore, Md." The first mentioned was built in 1893 and was devised by Mr. Wolf and named for him. In this case the sodium hypochlorite was obtained by passing an electric current through a strong solution of lime and salt. Good bacterial results were obtained and a partial removal of organic matter.

In 1907 Prof. E. B. Phelps, in conjunction with the New Jersey State Sewerage Commission, experimented at Redbank, N. J., on the treatment of septic sewage with chloride of lime. From Aug. 19 to 31 7½ parts of available chlorine were used per million of septic sewage, and effected a removal of 95 per cent of the total bacteria and 94.3 per cent of the B. coli after standing 45 minutes, and 99 per cent of the latter after standing 90 minutes. This treatment was more or less unsatisfactory, and during September the amount of available chlorine was increased to 12 parts, which gave a removal of 99.7 per cent of total bacteria and 99.96 per cent of B. coli. With the latter amounts used, the cost of chloride of lime was about $3.50 per million gallons of sewage.

At Baltimore, Md., Prof. Phelps and Mr. E. B. Whitman conducted experiments at the Wallbrook station, where was treated the sewage from a small section of the city. The sewage passed through a septic tank, followed by a sprinkling filter, and the effluent from the latter was treated with chloride of lime. During the six months of the experiment an average of 2.2 parts of available chlorine was used per million of sewage, and the average reduction of bacteria was 95.5 per cent, more than 98 per cent reduction being obtained in 69 per cent of the tests, and less than 90 per cent removal being obtained in only 9 per cent of the tests. The cost of bleach averaged about 70 cents per million gallons treated.

DUMPING SNOW IN THE SEWERS

Two classes of officials, those in the Street and those in the Sewer Department, will be interested in an idea which is being looked into by President McAneny, of New York, for getting rid of snow by some other way than by carting it from the streets, which method has already cost New York about $1,500,000 this winter. This is by dumping the snow into the sewers and there melting it by special appliances. Dumping into the sewers is not a new idea and is practiced to a greater or less extent in several cities. The present proposition, however, provides for special manholes into which snow is to be dumped, the opening of which is sufficiently large to enable a load of snow to fall through it readily. At the bottom of this manhole and resting upon the crown of the sewer would be a cast-iron grating perforated to permit melted snow to run through into the sewer below. Around the bottom of the manhole and just above this iron plate would be small wrought-iron gas pipes provided with a number of burners, so that 100 or more of these would be spaced at regular intervals around the bottom two or three feet of the manhole wall. By thus concentrating all the heat in the manhole practically all of it would be used in melting the snow.



SNOW-MELTING MANHOLE

Perhaps the chief objection to dumping snow into sewers is the clogging and obstructing of the sewer which is likely to be occasioned by street dirt and all sorts of matters, from paper to barrel staves, which are sure to be gathered up with the snow and be dumped into the sewer. In addition, the dumping of unmelted snow in large quantities at one point would probably result in choking the sewer with wet snow, even if the dirt and rubbish contained in it did not do so. Under the plan suggested, this rubbish would collect on the iron grating above referred to and be raked into a side chamber constructed alongside of and communicating with the manhole in which a workman would stand for that purpose. Aside from the cost of construction of the special manholes at sufficiently numerous points, the chief objection of this plan appears to be that the cost of gas furnishing the heat required for melting the snow would be many times that of hauling the same to the river; while Commissioner Edwards estimates that the saving of cost to the Street Cleaning Department would be 50 per cent of the present cost of doing this work.

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FEBRUARY 2, 1910.

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Machinery on Sewer Work

THE day of hand-grinding of corn and even of hand-breaking of stone is fast becoming a memory except where the aim is to kill time. Machinery is taking the place of manual labor wherever possible, or, at least, wherever cheaper; and machine-made contrivances are supplanting the crude hand-made ones for the same reason—economy. The description in this issue of the sewer construction work at Baltimore illustrates to what an extent this is true in that class of contract work. It is cheaper to raise material from a deep trench by bucket than to "stage" it out. Cheaper then to transport it along the trench by cable or overhead carrier or car than to load it into carts and haul it over an already too contracted roadway. Iron braces, readily adjustable, are ultimately cheaper and even more convenient than hand-sawed wooden ones. For many sewers sheet steel is preferable to wood for forms, and is almost necessary for concrete sewer construction. It is a striking illustration of the belief of large contractors in adequate machinery that one of those engaged on the Baltimore work has $11,000 worth of machinery on a $45,000 job.

The matter of plant can, of course, be overdone, and especially can poor judgment be used in selecting it. It would generally be a waste of money to use a cableway system in excavating an 8-foot trench; and where a wide excavation is to remain open for months a heavy timber brace would probably be better as well as cheaper than an extensible iron one. But it is a question whether even for the narrow trench in the 10-foot alley referred to in this article, the location would not have made a cableway, or at least a light trenching machine, a profitable substitute for "staging" out the dirt and carrying it back by wheelbarrow.

The actual excavation is now being done by machinery on a number of contracts, where the soil is suitable. A steam shovel may be used for large excavations, working from the surface where braces are used. For narrow trenches peculiar excavators are on the market, there being two general styles; in one of which a large wheel, carrying buckets with cutting edges, revolves in the trench, in the other an arm carrying an endless chain with buckets attached is lowered to the desired depth. And for tunneling in earth or soft rock a machine similar to a large auger has been used. For concrete the stone is crushed, the ingredients are measured and mixed and deposited in place, all by machinery.

And so the list might be extended indefinitely. And this very multiplicity of aids makes successful contracting a more complicated matter than formerly; also one requiring more capital. The contractor who can "drive" men, and relies for the rest on a saw, ax, maul, lumber and a hand pump now has no place except as foreman, or contractor for pieces of work so small that they would not warrant the use of an elaborate plant. The contractor who does big things must keep himself informed as to the latest devices for his class of work, and be as ready to "scrap" the antiquated machinery of five years ago as would a progressive electric light superintendent.

Unusual Damage from Leaky Sewers

IF reports from flood-stricken Paris are at all correct, that city is suffering a great deal more severely from the high water than would be the case were her sewers water tight, or as nearly so as the best modern brick-in-cement construction would secure. The greatest damage appears to be done, not by the flooding on the surface, but by the thorough saturation of the ground by water seeping out of the sewers. Many of these large sewers are centuries old; and while the soil under the inverts is probably rendered approximately impervious by deposits of sewage solids, the soil and masonry of the upper six to ten feet are probably more or less open to percolation.

The conditions in Paris are not duplicated anywhere in this country; but the magnitude of the damage calls attention to what may occur on a smaller scale wherever sewers are not tight, when high water fills them unusually full or even places them under a head. Flooded cellars and water-soaked ground would be a penalty incommensurate with the slight saving secured by failure to construct tight sewers.

Testing Sewer Pipe

WE call attention to the description on another page of tests of sewer pipe which are made by the Sewer Bureau of Brooklyn, N. Y. We believe this is the only municipality which regularly tests sewer pipe. Brick, cement, and even sand and stone are tested in many cities, but sewer pipe is not submitted to any test, only to inspection for cracks, blisters, dimensions, etc. It may be that the tests described are not the best, but they are at least a long step in the right direction and have proved their value by the high grade of pipe secured. One of the tests, by the way, may be conducted readily in the field, requiring only a ten-pound ball and some sand to bed the pipe in.

NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest, Under Consideration by City Councils and Department Heads—Streets, Water Works, Lighting and Sanitary Matters—Police and Fire Items—Government and Finance

ROADS AND PAVEMENTS

Ancient City Owns But Two Alleys

Alexandria, Va.—A communication on alleys has been received by the City Council from Corporation Attorney S. P. Fisher, through Mayor Paff, in which he states that there are only two public alleys in the city. All the other alleys, he said, are private, and Council has only such authority over them as it has over other private property. The limited authority is unsatisfactory and at times embarrassing. He also added that whenever Council desires to construct a public sewer in any of the said alleys it is necessary first to obtain the consent of the abutting property owners. In view of the fact that the question of repairing and cleaning the alleys generally falls upon the city he suggested an amendment to the city charter by the Legislature to make all alleys public so that the city can have supervision over them. The matter was referred to the General Laws and Street Committees.

Oil on Roads Prevents Washouts

Binghamton, N. Y.—County Superintendent of Highways Charles Van Amburg reports that the oiling of the roads has been a great success and two bad washouts last week demonstrated that the oiling has been a great protection to the roads. At Chenango Bridge the river washed over the road between the bridge and the village, but the oil prevented any of the roadbed from being washed out During former years this road has been severely damaged by the floods. Another road east of the State Hospital has gone through the same experience during the past few days of high water. The oiling of all the roads in the county next year will be recommended.

Memorial Bridge at Boston

Boston, Mass.—If the plans of Mayor George A. Hibbard and City Engineer William Jackson materialize the old Soldiers field bridge, near the Harvard stadium, in Cambridge, Mass., will be torn down, and in its place will be erected one of the finest and most unique bridges in the world. It is proposed to construct the columns and entrances of the bridge as memorials of various Harvard classes, the expense to be defrayed by them. It is planned to model the structure after the famous Alexander III. bridge that spans the Seine in Paris. Some years ago Boston appropriated $125,000 for its share of the new bridge and proposed a draw structure. Cambridge and Harvard officials insisted on a drawless bridge.

May Have Official Paver

McKeesport, Pa.—An ordinance is pending before Council which contains the following clause: "All paving or repaving shall be done by an experienced paver, who shall be selected by bid by the Street Committee and approved by Councils for a term of one year."

Asphalt Plant and $5,000,000 Worth of Street Work

Spokane, Wash.—One of the pecularities of the laws in Washington came to the surface here, when E. O. Connor, Corporation Counsel, said in an opinion to Mayor Pratt that while the city of Spokane may build an asphalt plant and sell the product to contractors, who, in turn, pave the streets, there is no State law authorizing the municipality to do its own paving. However, it is added, the law gives the city full power to use the products of the municipal plant to keep its thoroughfares in repair. Mr. Connor holds that an act of the Legislature will be necessary to give the city the right to lay its own pavements. The Engineering Department of the city has passed upon plans for more than $5,000,000 worth of bridge and street work to be completed before the close of 1911 and contracts for $3,500,000 have been awarded. In addition to this the city intended to do about 20 miles of paving on its own account this year.

Area and Cole Holes Regulated

Staunton, Va.—An ordinance concerning cellars, coal holes and areas has been adopted by Council and its enforcement has been placed in the hands of the General Manager of the City, whose duties were explained in a recent issue of the Municipal Journal. The ordinance as published by Newton Argenbright, Clerk, follows:

1. Every cellar or area which opens in a sidewalk shall have such opening covered wtih substantial iron grating, plate iron, or iron and glass, which shall be rough surfaced and placed flush with the pavement. The entrance to every cellar which opens in a sidewalk shall be covered with two doors of equal width, so constructed that when closed they shall be without joints and flush with the pavement, securely supported, and when open shall each stand upright and at right angles to the pavement and be held in such position by connecting bars or chains at the end of said doors nearest the building line. No cellar doors shall be allowed to fall back or lie open flat upon the street or sidewalk, nor to remain open any longer than necessary and while in actual use.

2. Every coal hole opening in a sidewalk be covered with a substantial iron plate with a rough surface placed flush with the pavement, and every coal hole hereafter constructed which opens in a sidewalk shall be located not more than ten inches from the curbstone and shall not exceed eighteen inches in diameter. The owner of any house, the cellar, coal hole or area to which does not conform to the requirements of this section, who shall, after notification by the general manager, fail or refuse to comply with its provisions, shall be fined not less than two nor more than ten dollars for each day such violation continues.

3. This ordinance shall be in force on and after the first day of February, 1910.

All ordinances and parts of ordinances in conflict withl this ordinance are hereby repealed.

To Tax Sidewalk Basements

Topeka, Kan.—Mayor William Green is behind a movement to require merchants in the business section of Topeka to pay the city rental for sub-sidewalk space. Most of the business houses have basements running under the sidewalks. As the walks belong to the city the Mayor thinks the merchants should pay rental for the space, the revenue to be used in equipping playgrounds for the children. The City Attorney is drafting an ordinance of that kind.

Novel Street Signs in Cincinnati

Cincinnati, O.—Street Car Inspector William Wallace has turned inventor, and, having secured permission from Service Director Sundmaker and the Union Gas and Electric Company, had his men place on a lamp post at the northeast corner of Eighth and Plum streets a new street sign. The sign consists of two strips of metal, with a black ground, and on this are aluminum letters spelling the name of the streets, "Eighth" on the Eighth street side and "Plum" on the Plum street side, the letters running down the post and not at right angles to it. The sign is so placed that the rays from the electric lamp fall directly upon it, making it plainly visible even on a dark night. Wallace has applied for a patent on the sign. The city officials have been looking about for a suitable street sign, and if the sign proves to be as good as it is believed it is, it is possible some arrangement may be entered into between the city and Wallace for the general use of his signs.

Boulevard Plans Before City Commission

Chicago, Ill.—Mayor Busse's Chicago Plan Commission, consisting of 324 members, met in the Council chamber to consider the converting of Twelfth street into a boulevard between Ashland and Michigan avenues so as to form a connecting link between the south and west side park systems, also a plan for another driveway connecting the south and north side systems. The commission points to the recent ordinance widening Michigan avenue between Jackson boulevard and Randolph street as one of its accomplishments.

SEWERAGE AND SANITATION

Cooperative Municipal Enterprises

Achison, Kan.—The prize council of Kansas is at Atchison, according to Dr. Emley of the University of Kansas. He says the City Council owns both the water works system and also the graveyard and that the two institutions are run together for the purpose of making the greatest profit. The sewerage system is so arranged that it opens onto the Missouri River only a short distance above the intake of the water works pumping station so that the people of the town get all the sewage of the town pumped back again in the water works system and as a result the death rate in the town is high, and the sale of lots is enormous and bring a good profit. He says typhoid fever is more prevalent in Atchison than in any other town in Kansas he visited while with the tuberculosis exhibit, and that the water supply is positively the worst he has seen anywhere.

Tapping Sewers in Alexandria

Alexandria, Va.—An animated discussion took place among the members of the City Council last week on the question of the construction of sewers and the laws governing the tapping of them, together with the enforcement of the sewer laws, when an ordinance came in from the Board of Aldermen, passed by that body, carrying with it an appropriation of $550 for the construction of a sewer in a court. It was originally stipulated in the ordinance that the money was to be available when the six signers for the sewer had deposited into the city treasury the sum of $150, but this time it was passed when five property owners had signed and had deposited only $125. Councilman Leadbeater explained that the law for tapping sewers is not enforced. According to a statement made by Councilman Birrell, the Corporation Attorney some time ago informed him that there is no law whereby a fine can be imposed on property owners who fail to tap sewers that pass houses owned by them where other than rainwater runs on the streets. The action of the Board of Aldermen in passing the matter was concurred in.

Sewer Laterals for Every Lot

Evansville, Ind.—An ordinance has been presented to the City Council by William Woolley, Councilman-at-Large, requiring sewer connections to be laid to the property line of every lot before the street is improved. This will do away with frequent excavations on improved streets, to tap sewers, a thing which has ruined many improved streets in Evansville. Members of the Board of Works are heartily in favor of the ordinance.

Tar Deposit in Sewer

Fond du Lac, Wis.—The January thaw which set in last week made it necessary for the city to flush the storm sewer extending from Macy street west to the east branch of the river. The men in charge of the flushing operations declared that the sewer was half filled with tar believed to have been emptied into it from the gas plant. Several of the city officials inspected the sewer after the report and City Council will now take steps to have the gas plant refrain from using the city sewer and construct a private sewer.

Louisville to Enforce Anti-Spitting Law

Louisville, Ky.—The Board of Public Safety, in view of the fact that it has so frequently been urged by the Anti-Tuberculosis Association to enforce the anti-spitting ordinance has issued orders that police in plain clothes and detectives be detailed to this service in order that the habit of spitting on walks be broken up. Chairman Tierney of the Board said that the publication of the ordinance would be the last warning and that the promiscuous expectorating public had better be a little more cautious hereafter. Any person violating the ordinance passed recently is subject to a fine from $1 to $50 for each offense.

Western City Against Spitting

Durant, Okla.—The anti-spitting ordinance is to be strictly enforced, and Mayor Bowles will probably have copies of the ordinance printed and posted up about town and signs printed on the sidewalks forbidding spitting on them.

Opposition to Passaic Valley Sewer Withdrawn

Newark, N. J.—An agreement has been reached between the Passaic Valley Sewerage Commission and Col. Wm. M. Black, U. S. A., regarding the method of purifying the sewage before it is discharged into tidewater at Robbins Reef. Plans have been drafted by the Commission embodying recommendations made by Col. Black, which, when adopted, will result in the withdrawal of opposition on the part of the Federal Government. A bill has been drawn up for passage by the Legislature which will bind the State to comply with the requirements. The treatment of the sewage will comprise screening and sedimentation in tanks large enough to keep the flow through them down to 0.5 inches per second under average conditions and to 0.75 inches during periods of maximum discharge. The effluent is to be delivered in forty-foot depth of water through a gridiron of parallel perforated pipes covering an area of three and a half acres.

Sewers of Knoxville

Knoxville, Tenn.—Treating of sewers in his last annual report, City Engineer S. D. Newton, just retired, says:

There have been constructed during the year 27,883 lin. ft. or nearly 5.3 miles of storm sewers, including vitrified clay, cast-iron pipe and reinforced concrete culverts. During the same period there have been laid 18,813 lin. ft., or nearly 3.6 miles of sanitary sewers, practically all of which is of 8-in. vitrified clay pipe. The drainage problem in this city is a difficult one, but I do not consider that I have laid one foot of storm sewers more than was absolutely necessary to take care of the drainage on improvement districts. I have no apologies to offer for the policy I have followed in this regard. I hope that the scheme of laying networks of lateral sewers connecting directly or indirectly with the First or Second creek mains may be continued, and I trust that before many years a main sewer will be built up Third creek in the extreme west end of the city and through the valley in the northern part of the Ninth Ward traversed by University avenue.

Waste in Rivers to Be Investigated

Providence, R. I.—The City Council has adopted a resolution appointing a committee and providing that steps be taken to abate the nuisance in the city of Providence caused by manufacturers' wastes and other substances in the Moshassuck and Woonasquatucket rivers.

Defects in Tile Sewer

Salt Lake City, Utah.—Many complaints of defects in the large 30-inch tile sewer on Ninth South street have been received in the City Engineer's office, and investigation has shown that no concrete was put in at the joints to cement the pipe together. As a result of this, the weight of the ground over the pipe has slowly borne down upon the joints until they have sagged, thus allowing the sewage to escape and cause more dangerous faults. Several of these breaks have been repaired by employees of the City Engineer's office, and the same condition has been found in each instance. It is believed nearly all of the pipe has been constructed without the cement at the joints. The work was passed upon and accepted by the Board of Works upon the favorable report of Chief Inspector Fitzpatrick.

Smallpox in Massachusetts Towns

Wakefield, Mass.—At least $15,000 is the estimated expense to the town caused by the outbreak of smallpox in the past two weeks, which means a tax rate increase. A special town meeting is to be called soon to appropriate the money to liquidate the expense incurred in fighting the infection. Of the forty cases of smallpox in Wakefield, Reading and Stoneham, it has been found that thirty-seven of the patients had not been vaccinated. The other three had been inoculated twenty years ago.

Why Sewer Connections Are Not Necessary

Roselle, N. J.—Mayor C. W. MacQuoid in vetoing an ordinance requiring owners of property along the line of sewers to connect with same within thirty days after notification or pay a fine of $25 and $10 for each day afterward, gave as his reasons the high cost of living, high taxes and absence of immediate danger from the sewage in the sections where the connections would be least likely and where the enforcement of same would be a hardship.

Porters Must Not Sleep in White Berths

Austin, Tex.—The State Board of Health has prepared a new sanitary code for railroads, hotels and public buildings. One provision forbids Pullman porters from sleeping in the berths of white people and from using sleeping car linen for their own needs.

WATER SUPPLY

Protection for Water Supply

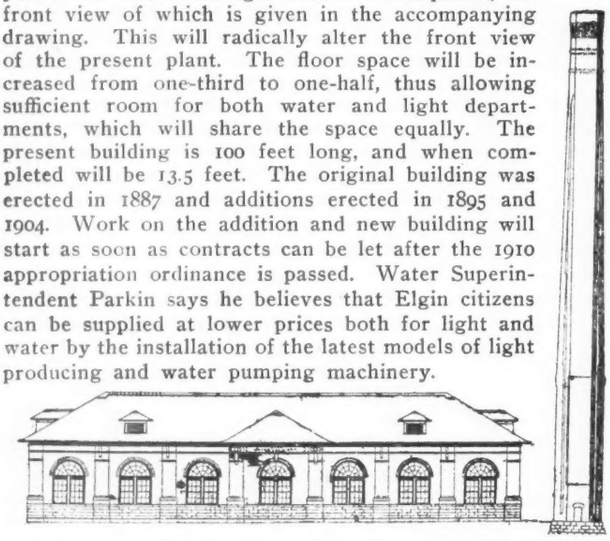
Boulder, Col.—City Council has passed and Mayor Alfred A. Greenman has signed the following ordinance:

Section 1. That to insure the pristine purity of the water supply to be delivered to the inhabitants of Boulder for table drinking and other uses through its public water system; to guard the mountain territorial source of such supply within the five-mile jurisdictional radius conferred by statute; to preserve from defilement or injury the several tributary streams, lakes, intakes, reservoirs, dams, outlets, trenches, channels, pipe-lines mains and hydrants constituting said system, it is declared unlawful for any person, firm or corporation to deposit within the limits used and occupied in the operation of said system any foreign or unwholesome matter or substance so as to permit the same or the ash or drainage thereof to flow or percolate into said city water, or for any person, without authority, to molest or interfere with any part of said system of water works, or to do any act or thing tending to injure the same or to cause the water thereof to become colored, polluted or unwholesome for human consumption.

Section 2. That any person, firm or corporation, or executive officer of employe of any company, who shall violate any of the provisions of Section 1 of this ordinance shall be deemed guilty of a misdemeanor and, upon conviction thereof, shall be fined not less than twenty-five nor more than three hundred dollars.

New Water and Light Plant

Elgin, Ill.—An improvement costing between $75,000 and $100,000 will be added to Elgin's equipment when the proposed new water and light station is completed, the front view of which is given in the accompanying drawing. This will radically alter the front view of the present plant. The floor space will be increased from one-third to one-half, thus allowing sufficient room for both water and light departments, which will share the space equally. The present building is 100 feet long, and when completed will be 13.5 feet. The original building was erected in 1887 and additions erected in 1895 and 1904. Work on the addition and new building will start as soon as contracts can be let after the 1910 appropriation ordinance is passed. Water Superintendent Parkin says he believes that Elgin citizens can be supplied at lower prices both for light and water by the installation of the latest models of light producing and water pumping machinery.



Water and Sewer Pipe Laid in Year

Evanston, Ill.—During the past year 14,043 feet of water mains have been laid by the city. A large portion of this is for the new intake for the pumping station, but there has been laid fully 8000 feet of water main not including the intake. Most of the mains were connections to new structures. In the last twelve months 7876 feet of sewer was laid, and 146 catchbasins and forty-five manholes were put in. Six new hydrants for the Fire Department have been placed and others rearranged so as to meet the demands of various sections of the city to the best advantage.

Meters May Create Municipal Plant

Johnstown, Pa.—Court has adopted a resolution which provides for a complete investigation of the proposed installation of water meters by the Johnstown Water Company, and gives a hint of the installation of a municipal water works. Mayor Alex Wilson is chairman of the special committee which will inquire into a proposed increase in rates, particularly as it may affect small consumers, the rates in other cities, and the legal right of the city to establish a municipal water plant.

Year More of Work on Reading Filters

Reading, Pa.—It will require another year to complete the Maidencreek filter beds, which will supply part of the water used by the city. The ten beds are each designed to filter 1,500,000 gallons per day.

City Water Plant Pays

Kansas City, Mo.—In their first quarterly statement of the operation of the plant bought last fall from the Metropolitan Water Company, the Commissioners say the plant has paid well. After receiving revenues from hydrant rentals for three months and paying interest, operating expenses and $4,000 for permanent improvements, the commissioners had $32,153 on hand. Of this, $9,000 represented customers' deposits for meters. The $4,000 expended for improvements, the Commissioners say, properly should be charged to permanent investment. So they figure that the net earnings for the first three months of municipal ownership was $27,153. In addition to this they have improved the water service and are now serving pure water, instead of mud. On the basis of $108,000 earnings a year the Commissioners figure that they can pay the $67,500 annual interest on the 1½ million of water works bonds, pay all operating expenses and have $40,500 left each year for the sinking fund. By enlarging the plant and extending the hydrant service to the new territory recently annexed, including Argentine, the Commissioners say the revenue and the earning capacity will be very largely increased. To do this properly, however, will require an issue of about half million dollars of bonds, which would bring the total cost of the plant to about $2,000,000.

Municipal Water Works Saves Money for Gadsden

Gadsden, Ala.—Through the city owning the water works plant $980 is being saved to the city each year in the fire water plugs. There are now in operation 130 fire plugs—under the contract the city had with the old water works company $46 was paid for the use of each plug, making $5,980 a year. The interest on the bonds issued to purchase the water works plant is $5,000 a year, so it will be seen that the city is saving $980 a year. More plugs are to be installed and if a company owned the plant this would be an additional expense to the city, but under municipal ownership it costs nothing after the plug has been installed.

Helena Council Reduces Water Rates 30 Per Cent

Helena, Mont.—The City Council, by a vote of 11 to 1, passed an ordinance reducing water rates about 30 per cent. The plant is operated by a private company.

Water Charge for Actual Service Only at Fires

Houston, Tex.—An ordinance has been passed by Council abolishing the water rates charged to factories and manufacturing establishments for fire protection. These establishments have been paying the city $5 to $20 a month for this service, and the amended ordinance provides that the charge shall not be made in the future except when water is actually used, and in this case a charge equal to the meter rate will be made. The ordinance affects between 40 and 50 establishments in the city.

Test from Hydrants on New Pressure

Rome, N. Y.—Fire Chief Briggs, the members of the Board of Police, the Fire Commissioners and several of the paid and volunteer firemen were interested spectators of a test of the new water pressure for fire purposes near the Erie canal bridge in South James street last week. Four streams were played from three hydrants and the water was "shot" a distance of 126 feet in a horizontal direction and 75 feet in a perpendicular direction. The test was entirely satisfactory and showed that the city now has excellent water pressure and that the Fire Department has ample pressure to cope with almost any blaze. In the past, one fireman could handle a stream from the hydrant very easily, but with the new pressure it takes three or four.

Hidden River For Trenton Water Supply

Trenton, N. J.—For the purpose of determining the flowage of water of the underground river which is said to exist through this section and which has an outlet at White City Park, R. N. Jackson, the New York geologist, is digging a test well eight feet square below Spring Lake, the artificial body of water at the park. Mr. Jackson is of the opinion that a vast underground river crosses New Jersey, and claims to have tapped it at several points, each time finding sufficient flowage of water for city supply purposes. If it is proved that potable water abounds below Spring Lake an effort will be made to have Trenton purchase the land and use the water for the city's supply.

STREET LIGHTING AND POWER

City Staked to Electric Lights

Duluth, Minn.—The City Council has passed a resolution to secure needed street lights which is greatly out of the ordinary, it being so framed that the Duluth-Edison Electric Company is given permission to erect lights at the designated places without putting the city under any legal obligations to pay for them, according to City Attorney C. S. Wilson. He declared that unless the city wants to, it need never pay for the light, and that the only obligation is a moral obligation. The resolution states, after giving the electric company permission to locate the lights, "provided that the erection and location of said light shall not obligate the city of Duluth to pay for the same at the present contract rate, but that said light be installed with the understanding that arrangement for compensation therefor be made at some future date when the condition of the light fund is such as to make payment practicable, legal and just."

Cheaper and Better Gas Wanted

Springfield, Ill.—The special Gas Committee has reported to the City Council on its work in the line of securing cheaper gas for Springfield. It favors an ordinance embodying these provisions:

Illuminating and fuel power of gas to be 22-c. p. by Bunson photometer.

Gas not to contain over twenty grains of sulphur in any form or over five grains of ammonia in any form, in 100 cubic feet.

Gas shall be free from the impurity known as sulphuretted hydrogen.

A Department of Gas and Meter Inspection and the appointment of a Gas and Meter Inspector.

Daily inspections shall be made of the gas, Sundays excepted, and a record shall be kept of such inspection, giving the illuminating and fuel power and purity and pressure of the gas for each day, and a full report for the month shall be given out by the Inspector, giving out the average illuminating and fuel power for the month.

A consumer may have any gas meter in his house tested by the Gas Inspector upon the payment of fifty cents. If the meter is registering too much he gets his fifty cents back and the gas company has to pay it. If the meter is just right or registering too little the consumer has to pay the fifty cents.

Council Orders Street Lighting Discontinued

Rexburg, Idaho.—The City Council has instructed the Clerk to write to the Idaho Power Company at Idaho Falls and order the company to discontinue the electric lights on the streets of Rexburg. The Councilmen believe the light company is not abiding by the agreement made with the city.

Bell to Warn Gas Users

Emporia, Kan.—Engineer Alva Smith has invented a device for giving notices of changes in natural gas pressure. The device may be adjusted so that a bell will ring when any pressure is reached. It will give warning when natural gas is left burning in stoves at night, when the pressure becomes too strong or the gas goes out.

Gas Plant Blows Up.

Elkhart, Ind.—The Benton Harbor and St. Joseph Gas and Fuel Company plant in Benton Harbor blew up last week, completely destroying the old brick building and badly wrecking the new one. Four men were injured and many windows in buildings for blocks around were shattered. The supply of gas was cut off from hundreds of homes and business houses. The damage is estimated at $35,000.

Fire Destroys Gas Plant

Orlando, Fla.—The city gas plant, owned and operated by the Orlando Water and Light Company, was entirely consumed by fire, but as the tank and some of the purifiers were not destroyed, Manager Grant was able to supply water gas in a few days.

Electric Light Plant Burned

Dana, Ind.—The electric light plant here was destroyed by fire last week. Loss about $6,000, with insurance for $4,200.

Gas Company Rejects Effort to Compromise

Minneapolis, Minn.—The last hope for an amicable agreement between the city of Minneapolis and the Minneapolis Gas Light Company for the continuation of the company's franchise for 20 years from Feb. 24, 1910, has gone. That is, unless the City Council agrees to waive the city's right to regulate the price of gas and control the future improvement work to be done by the company. The company's answer was made to the special Council Committee which for almost a year has been conducting negotiations. The answers cover the proposed regulatory ordinance as well as the contractual ordinance, and to the principal features of both the company gives an emphatic "No." In effect and as closely as the legal language permits, it says: Rather than to submit to the many provisions imposed, we prefer that the plant be valued and purchased by the city. The answer was prepared by J. O. P. Wheelwright and A. C. Cobb, attorneys for the company, following a trip to Philadelphia by the former and A. T. Rand, president of the company, to consult with the United Gas Improvement Company there, which company is owner of half the stock of the local company. The next move is for the city to proceed with the condemnation and purchase of the plant which the company claims is worth over six million dollars, and the city gas expert, W. D. Marks, says is not worth half that sum.

Reduction for Poor Lights

Fond du Lac, Wis.—The Eastern Wisconsin Railway and Light Company has given assurance to the city that the arc lights will be operated properly in the future, that there will be no occasion for complaint. The city deducted $150 from the bill of the company for November for the failure of the arc lights to test properly. Plans are being made to make a test of every arc light in the city, and if the lights test below what the contract calls for, the company will have to submit to a more drastic cut than before. Frequent tests will also be made in the future.

FIRE AND POLICE

Speed Limit For Fire Autos

Louisville, Ky.—In both boards of the General Council an ordinance fixing a new speed limit to be observed by the Fire Department and lighting companies in responding to alarms of fire in the city, was introduced last week. The measure restricts the firemen and all others to twenty miles an hour. In the upper board it was promptly passed, but in the lower board it was referred to the Committee on Fire Department. Action was brought about through the recent death of Chief Ben Dillon, who was fatally injured speeding to a fire in his automobile.

Gong to Arouse Firemen

Dalhart, Tex.—Dalhart's paid Fire Department is hereafter to be roused by the ringing of a large electric gong which Mayor W. D. Wagner has had installed at the fire station. This action was taken immediately after the recent fire, when confusion arose over the system of telephone calling.

Honor Roll for Firemen and Police

Syracuse, N. Y.—Commissioner of Public Safety H. E. Hessler has taken steps to establish a roll of honor on which the heroic deeds of Syracuse firemen and policemen will be recorded. Mr. Hessler believes that demonstrated efficiency and instances of personal bravery in the performance of duty form the truest basis for promotions in either department, and has called the attention of Chief of Police Martin L. Cadin and Fire Chief John P. Quigley to a section of the rules and regulations of the department on the matter.

Fire Alarm Fakers to be Jailed

Ventnor, N. J.—Councilman Carson introduced the very first ordinance of the new year which provides for the arrest and severe punishment of persons willfully turning in fake alarms or tampering in any way with fire plugs. The bill also makes it a misdemeanor for any one to open a fire plug by any means other than with a regular wrench.

Good Fire Record

Beloit, Wis.—It cost Beloit citizens 71 cents per capita to maintain the Fire Department during the year 1909, or a total cost of $10,595.82. The gross cost of maintenance was $11,406.60. This is figuring the population of Beloit at 15,000. The assessed valuation in the city of Beloit is $8,834,420, leaving the cost of maintenance at $1.22 per $1,000. In other cities of the same class as Beloit the cost of maintenance is from $1.25 to $1.50 per capita. The cost of maintenance in 1909 was a little over $1,500 less than the year before while in 1908 it was $2,000 less than the year previous. Only two fires occurred during the past year where it would have been necessary to use water if the department had been equipped with the large chemical tanks. As it was water was used less than one hour at any one time during the year, through a one-inch ring nozzle. That the department has kept the losses and number of runs down by constant watching of places where fire is liable to start unless refuse is removed promptly, is not questioned by any one familiar with Chief Nygren's activity.

Fire Record of City of Seven Thousand

Salida, Col.—A most remarkable record is shown by Captain Penwick of efficient service rendered by the Salida Fire Department during the past year. There has been only $100 damage done by fire during the entire year. There were thirteen fires during the year; eight were caused by gasoline explosions and five were from unknown causes. The total expense of the Department for the year 1909 was $3,815.81. This seems almost incredible for a city of 7,000.

Hose Freezes While Fire Rages

Bolton, Mass.—Bolton has a hand engine which was called out last week for a fire. The suction hose was dropped into a 30-foot well. When the company was ready to play the hose was frozen solid, the tub was out of commission and the home of Rev. E. C. Headle was ruined.

Physical Examination for All Police

Salt Lake City, Utah.—All members of the Salt Lake police force will have to pass a physical examination at once, and all special officers will have to apply to the Chief of Police for permits to arrest. All old badges will be called in, and the Chief of Police will know in the future the men who are asking to have police power. All of these, too, will have to pass a physical examination by the City Health Commissioner.

Town to Tax Fire Department

Wareham, Mass.—The town of Wareham has placed her Fire Department's real estate on the tax list. The Fire Department is a volunteer association, with its own officers separate from those of the town, and is organized as a joint association with the Water Department. It is understood that the income from the water rates supports the volunteer fire association. A tax has never been levied upon the Fire Department's property. The valuation of this property is in Onset $1,650 and in Wareham $16,800, including pumping house and plant valuation, $7,000; standpipe, $7,000, and fire station, $1,500. The tax assessed is $265.68. No tax has been placed upon the apparatus.

Defense for Volunteer Firemen

York, Pa.—Replying to the committee of the National Board of Underwriters that condemned York's Fire Department, Mayor Jacob E. Weaver, in a letter sent that body, says that the report contains statements which are contradictory and misleading, and, in the main, so theoretical as to not be worthy of serious consideration. The Mayor insists that York is not ready to give up its Volunteer Fire Department for a Paid Department, because the Volunteer Department in York is just as effective as a paid one could be. The friendly rivalry existing between the companies, the city's executive says, is an incentive that results in effective service. The City Council also voted to condemn the Underwriters' report and send a bill for the repair of the Goodwill engine to the underwriters. It is charged that the engine was damaged to the extent of $250 or $300 not because of any defect in it, but because of the ignorance of the "expert" who tested it, as he put the engine up to 900 revolutions in the belief that he had it no higher than 600, the number for which it was guaranteed.

GOVERNMENT AND FINANCE

City Treasurer to be Paymaster

Augusta, Ga.—Mayor Barrett has instituted a new method of paying off the city employees. In the future all salaries will be paid by the City Collector and Treasurer. In the past the heads of the various departments paid off the men in their departments, the money being put up in pay envelopes at the office of the collector and treasurer, and turned over to the heads of the departments.

"Public Defender" New City Officer

Cleveland, O.—A new post, to be called the "public defender," will be created at once. The defender will be an assistant to the City Solicitor, and it will be his duty to oppose the prosecutor in the trial of poor prisoners in the police courts.

City Bonds a Good Investment

Durant, Okla.—M. F. King, of Chicago, representing John Nuveen & Co., bond buyers, attended the opening of the bids for the $40,000 worth of city water extension and electric light bonds recently the city has for sale, and said Oklahoma bonds are "good stuff." In the last thirty days, he said, his firm has bought $290,000 in bonds of various Oklahoma cities.

City Shares Earnings of Trolley Company

Seattle, Wash.—Greater Seattle has received, as its portion of the earnings of two street car systems during 1909, the sum of $82,357.13. Checks for this amount have been turned into the city treasury by Comptroller H. W. Carroll. The report of the Seattle Electric Company shows total earnings of $3,963,940.35. The Eastlake Avenue line, reaching the exposition, leads with total receipts of $419,866.03. The Madison Street line comes second with earnings of $277,186.65, and Yesler Way third with earnings of $238,030.70. Mail and chartered cars brought in $49,262, and license of $225 was paid on nine cars under the old ordinance. During the year the sale of tickets of every character amounted to $474,158.81.

Greater Care in Passing Ordinances

Providence, R. I.—In order that members of City Council may familiarize themselves with proposed ordinances by the time they come before them for action Alderman Kelso has introduced the following ordinance:

Committees of the City Council, or either branch thereof, are hereby directed to cause to have printed and distributed to the members of the City Council each and every ordinance or proposed ordinance bearing the recommendation of such committee before the same shall be in order before the City Council, or either branch thereof, for action thereby

Under the present procedure somebody introduces an ordinance in either branch of the City Council, it is refered to the proper committee and nothing more is known of it until the committee reports it with recommendations, and the Council must rely entirely upon the committee in the consideration of an ordinance submitted to it, and it is thus made easy for an ordinance to get through without the proper supervision of the Board of Aldermen or Common Council.

Municipal Bonds of Kansas

Topeka, Kan.—J. M. Nation, State Auditor, in his annual report shows that during the fiscal year 1909 the State Auditor registered $4,341,858 worth of municipal bonds and that the municipalities over the State spent that amount for improvements. Wyandotte County leads the list with a total bond issue of $999,289. Shawnee County had $284,222, Sedgwick County, $380,601, Saline County, $170,320 and Clay County $11,000.

Purchasing Agent for Salt Lake City

Salt Lake City, Utah.—The creation of the office of City Purchasing Agent was assured last week when the Board of Estimate and Apportionment of the City Council, in a meeting at Mayor John S. Bransford's office, passed a measure recommending its establishment with an annual salary of $2,400. The Purchasing Agent will be appointed by the Mayor, and carries out one of his most urgent requests in his annual message.

Would Nominate Commissioners for Specific Offices

Des Moines, Ia.—Dr. E. E. Dorr, one of the severel gentlemen who have announced themselves in Des Moines as candidates for the City Council, has a plan for amending the commission plan law so that each candidate will run for a certain place in the council. In the opinion of Dr. Dorr, each Councilman should be elected for some specified department, instead of being chosen as one of the four members who do not know until after they are sworn in what departments they will be assigned to superintend. Under the present arrangement the Mayor is the only man who has a department designated to him by law. It is the Department of Public Affairs. The other four members of the Council must distribute the superintendencies of the Departments of Streets and Improvements, of Accounts and Finance, Parks and Public Property, and Public Safety to suit themselves, or as suits the judgment of the majority.

Poll Tax May Be Spent for Fuel

Fort Worth, Tex.—The city expense budget for 1910 has been adopted by the City Commissioners and it was decided after some discussion not to levy a poll tax for the current year. Mayor Davis was foremost in urging that the city poll tax be abolished, saying that such weather as the present compelled many laborers and others to spend their spare money for fuel and food and none was left to pay poll taxes, and as a consequence many were disfranchised. The Commission voted unanimously against a poll tax for next year.

What Perth Amboy Mayor Wants

Perth Amboy, N. J.—Mayor Albert Bollschweiler, in his annual message urges the establishment of a partly paid Fire Department, motor cycle police to look after speeding automobiles, the abolition of grade crossings, licensing of theaters and billposters, the disposal of garbage in an improved manner and the construction of at least one public recreation pier.

Workmen Want Protection

Seattle, Wash.—To protect workmen on the lower floors of large buildings under construction, Fred S. McCullough, president of the State Council of Carpenters, will ask the State Federation of Labor and the Seattle City Council to urge the adoption of a plan requiring every floor of such buildings to be planked as soon as the joists are in place. Accidents resulting from the lack of such protection, McCullough declares, caused six deaths in the city this year.

New Board to Enforce Business Methods

Waterbury, Conn.—If any bills in the future are to be approved by the Board of Finance, they must not only be approved by the heads of departments, but must be sworn to before the City Clerk or Comptroller, and have the certification of the Comptroller that the computation of the amounts is correct and that the appropriations are sufficient to pay them and, in the case of the purchase of supplies, the bills must be accompanied by the requisition issued by the Comptroller. In other words, the new Board of Finance intends to enforce strictly the provisions of Sec. 96 of the charter, something that has not been done for the last ten years. Despite the fact that the charter plainly says that all bills must be verified by the oath of the claimant, Chief Samuel C. Snagg, of the Fire Department, was the only man at the head of any department who has done this. The board has voted that the City Clerk inform all heads of departments that hereafter no claims will be allowed by the Board of Finance unless bills for all such goods conform in every respect with Sec. 96 of the charter.

New Paying System for City Employees

Youngstown, O.—City Treasurer Pyatt Hubler has inaugurated a new system of paying city employees. The system is in vogue in Cleveland, and requires those receiving checks to sign a card on which the amount and time of payment is written. This gives the treasurer a check on all wages and salaries paid out. By the former method no signatures were required of the employees. The new system is expected to simplify and make easier the making of reports and statements.

STREET CLEANING AND REFUSE DISPOSAL

Garbage Ordinance Violators Fined

Baltimore, Md.—Charges against eight violators of the ordinance prohibiting the removal of garbage and carrying it through the city except by persons contracted with were disposed of by Judge Duffy in the Criminal Court, who assessed fines of $2 and costs in each case, which amounted to something close to $20. The cases were taken up after a long delay occasioned by action of the Court of Appeals in the case of William R. Schultze, against whom there were nine cases.

Fire Engines Clean Streets

Camden, N. J.—With the assistance of the Fire Department, Street Commissioner Alfred Sayrs has made the business thoroughfares of Camden have something of a presentable appearance. The engines were called into service and strong streams of water washed away the mud and slush.

Metal Garbage Carts Replace Wood

Charleston, S. C.—The Street Department is much pleased with the use of the new metal carts which were recently substituted for the wood for the garbage collections. The chief advantage of the metal carts is that the carts are waterproof, especially commending them over the wood carts whose drippings often soil the streets. The wood carts will be used for the handling of dry stuff in street work. The difference in cost is comparatively small.

Chicago Spends $25,000 on Snow and Stops

Chicago, Ill.—Carting of snow from the streets has been stopped by the city, as the $25,000 appropriation allowed for it this year has been exhausted. The expense for the first eighteen days of the year averaged $1,300 a day. The fall has been heavier than at any time in recent years and gangs have been working day and night.

Thousand Sprinkling Bills Unpaid in Dayton

Dayton, O.—William Turner, contractor for the street sprinkling last year, has returned to Clerk Daniel Murphy of the City Engineer's office nearly a thousand unpaid bills for street sprinkling, which he claims he is unable to collect. The Engineer's report on the unpaid bills will now be considered and an ordinance for the issuance of bonds to take care of the unpaid bills will be introduced. Following the ordinance the bills will lie in the City Auditor's office for 30 days, and then if still unpaid will be turned over to the County Auditor with 10 per cent added to each of them. The County Auditor will add them to the tax duplicate and the city debtors will be confronted with a larger sprinkling bill in a form that they cannot get out of paying without submitting to a Sheriff's sale.

Maryland Town Adopts Snow Ordinance

Havre de Grace, Md.—The City Council has passed an ordinance requiring the removal of snow from paved streets or boardwalk within eight hours after its fall, under penalty of a fine of $2 and the cost of removal by the Superintendent of Streets. Mayor A. Hamlin Carin has signed the measure, which became effective at once.

Raised Rates for Sweeping Streets

Marysville, Cal.—The City Council has fixed the rate on street sprinkling for the season just closed at the same figures which prevailed last year, 12 cents per block for street frontage and 2 cents per block for alley frontage. The rate for street sweeping was fixed at 40 cents per front foot, being 5 cents in advance of last season's figure. The cause of the raise on street sweeping is the result of the demand in the middle of summer by the contractor for better pay, which the Council was forced to allow. The street sweeping is now done better and at less cost to the merchants than when hand brooms were in vogue, up-to-date apparatus, the property of the municipality, having been put in by the present Council.

Garbage Transferred from Health to Street Department

Salt Lake City, Utah.—The city plans to place the garbage hauling under the Street Department instead of the Board of Health, and also to pay the garbage haulers $4.50 a day instead of by weight.

Harrisburg Sets Pace in Garbage Collection

Harrisburg, Pa.—Although Harrisburg has one of the worst possible systems of garbage collection at the present time, it is claimed that it is unique in having a contract that has set the pace for other cities of the country. However, some of the glory is due to Cleveland. Cleveland and Harrisburg a few years ago were the only two cities in the country which compelled the garbage collectors to go to the back gates of houses to gather garbage and ashes. In other cities, such as Philadelphia, for instance, the collection of garbage has long been a scandal. There the cans are put out on the streets and the wind blows paper and ashes about in a disgraceful manner. Since Cleveland and Harrisburg set the pace seven other cities of the country have passed similar ordinances. Easton is now about to follow the lead.

Municipal Service for Elgin

Elgin, Ill.—Health Officer Fischer's plan of having garbage collected, as a city health precaution, has been put through the City Council by the granting of an appropriation of $2,000. Wagons will be sent to all parts of the city at regular intervals to collect whatever garbage is placed in metal receptacles. Each individual will be required to provide these receptacles.

Free Collection a Success in New York Town

Middletown, N. Y.—Six months' trial of free garbage collection has shown that it is a necessity, and the people of Middletown would not go back to the old plan of garbage heaps in their back yards, but it has also been demonstrated that a better system can be devised than is at present in use. In the first place, the contractor bid too low and cannot afford to give the proper attention to the work. No contractor can collect all the garbage and ashes in a place the size of Middletown for $1,950 a year. It will probably cost from $2,500 to $3,000 next year if let by contract. Many of the city officials believe, however, that the city should do its own collecting of garbage and ashes and not let the work out on contract.

Volunteer Snow Cleaner at Work

Morrisville, N. J.—Not satisfied with allowing the borough to clean the snow from the crossings during the last snowstorm, B. N. Bayard rigged up a wooden snow plow, attached his two horses to it and drove all around the town, cleaning many sidewalks and street crossings. This work of Mr. Bayard's was voluntary and he received no compensation for it. He merely did it for the good of the borough and for the benefit of the traveling public.

Old System Good Enough

New Britain, Conn.—The Board of Health, which by the direction of the City Council, made an investigation of garbage collection and disposal, recommends that no change be made in the present system of private collection. The expense of municipal collection and the erection of a cremation plant, it was reported, would be expensive, and the Board said that an improvement in existing conditions can be made by the earnest co-operation between the householders and the private collectors who feed the garbage to swine. The enforcement of city ordinances more rigidly is also urged.

Fire at Garbage Plant

Pittsburg, Pa.—Two men were seriously injured and four others hurt last week when a large gasoline tank exploded at the soap plant of Walker Brothers, on Herr's Island, a few miles from this city. The explosion caused a fire that consumed the big garbage drying plant.

York Would Clean Streets

York, Pa.—The establishment of a Street Cleaning Department is recommended by Mayor Weaver in his annual message to care for the fifty-two squares of paved streets of the city. After inquiry by the Street Commissioners and himself as to the manner and cost of doing the work in other cities, the Mayor states that the patrol system alone would be more expensive than to adopt a combination plan of machine sweeping and patrol sweeping. He urges the purchase of a sprinkler and sweeper, with horses and carts, as well as pick-up carts, which can be manned by men who might otherwise be a charge upon charity.

RAPID TRANSIT

Trackless Cars for Jersey Towns

Caldwell, N. J.—Trackless street cars, believed to be a practical possibility in view of the accomplishments of Thomas A. Edison with his storage battery vehicles, will soon be a mode of transportation in Caldwell and other communities in the mountain section of the county, if plans discussed by a number of men of wealth interested in the development of the northern part of the county at the office of John Ottenheimer materialize. Preliminary steps were taken for the formation of a new traction company, the headquarters of which will be in Caldwell, from which point it is proposed to run at least four, and perhaps five, different lines. Mr. Edison will be asked to construct a car, equipped with his storage batteries, large enough to seat twenty passengers, which could be run over ordinary macadamized roads without tracks. A franchise over certain routes, for as long a period as possible, would also be secured. This franchise would be so drawn as to give the company the sole right to operate its cars over these routes, as well as the privilege of afterward laying tracks through the thoroughfares if the company considered such a course advisable.

Cleaner Tram Cars Slogan for Denver

Denver, Col.—Violations of a city ordinance which prohibits expectorating in street cars will be dealt with to the full limit of the law in future. The City Health Department solicited the aid of the Fire and Police Board in capturing offenders and a plain-clothes man is now detailed to every tramway car with instructions to arrest every person caught violating the ordinance, and place him in jail.

Sanitary Cuspidors on Trolley Cars

Schenectady, N. Y.—The Schenectady Railway has been experimenting with a sanitary cuspidor on its interurban cars, and has ordered a thousand of them in the hope of educating the traveling public up to their use. General Manager Peck, who is interested in the fight being waged here against the spread of tuberculosis, is possibly responsible for the installation of these cuspidors, which are of cardboard, placed in brass receptacles, and destroyed at the end of each trip.

Improve Service or Remove Tracks from Trenton

Trenton, N. J.—Mayor Walter Madden, in a special message to the City Council, urged that steps be taken to procure an immediate betterment in trolley facilities and threatens the removal of the lines from the city's highways. The matter was referred to City Counsel Charles E. Bird for action, and the Mayor in a pointed communication to this official tells Mr. Bird that in the opinion of the Mayor the City Solicitor has the power to remove the trolley lines from the streets if there is not an immediate and radical change in the service now being furnished. After stating that the repairing of the tracks and the overhead system, the building of new cars and the installation of a new power plant may require time, he goes on to say that the use of dirty cars and the running of them in processional order can be remedied at once. The Mayor threatens that if some action is not taken immediately in regard to making a greater effort to clean the cars he will place special policemen to examine each car as it is sent from the barn, and, if unclean, it will not be allowed to go through the city.

Reforms by Railway Commission

Washington, D. C.—"Gratifying progress has been made in the direction of improving the local street car service," according to the second annual report of the Interstate Commerce Commission on Street Railroads in the District of Columbia, which has just been made to Congress. "The equipment of the cars has been materially improved; modern safety appliances have been installed; better route signs have been adopted, and heating apparatus has been extensively provided," the report states, and "following investigations conducted by the District Electric Railway Commission, the street railway companies have voluntarily instituted certain reforms which were much desired by the public, but as to which the commission was without jurisdiction to make an order."

MISCELLANEOUS

Bread Ordinance for Cincinnati

Cincinnati, O.—Assistant City Solicitor Goldsmith has sent to Councilman O'Brien a copy of the proposed bread ordinance for consideration by Council. The ordinance will provide for a one-pound loaf of bread as the standard, but adds that bread may be sold in half-pound loaves, three-quarter-pound loaves, double, triple, quadruple, quintuple and sextuple-weight loaves. Bread may be sold in no other way, buns, rolls, biscuits and fancy bread, also stale bread, excepted. The ordinance provides for fastening a tag, stamp, or making an impression on each loaf, bearing the name of the maker, his address and the weight of the loaf, and the seller of bread must have scales in his place of business, and must weigh the bread when asked to do so by the customer. The ordinance also provides for an Inspector and for a fine not exceeding $100, or imprisonment not exceeding ninety days for violation of the ordinance. Councilman O'Brien may introduce the ordinance Monday.

City Market to Crush Butchers

Des Moines, Ia.—The City Council, in an effort to crush the local combination of butchers, has ordered the erection, as soon as possible, of a market house. Rent will be free to farmers and truck gardeners who will sell direct to consumers.

Japanese Cherry Trees Must Be Destroyed

Washington, D. C.—Two thousand cherry trees, the gift of the Corporation of Tokio to Washington, have arrived and have been placed in the government storehouse at the propagating gardens. The trees are from 10 to 15 feet

Courtesy Washington Star.

JAPANESE CHERRY TREES PRESENTED TO WASHINGTON

high and of ten varieties of bloom. They were to have been planted along the new Potomac Drive, in the White House grounds and in the parks, but the experts of the Department of Agriculture have discovered that gallworms infest the roots of nearly all the trees, that a fungus growth has developed on the branches and that they are infected with an insect pest hitherto not known in America. The trees will have to be destroyed to prevent the spread of the diseases.

Money to Advertise City

Boulder, Col.—The City Council has decided to set aside, in the annual appropriation, $250 to be used for the purpose of advertising Boulder. It will appear in the regular appropriations ordinance to be passed in March.

Team Hire Raised, City May Buy

Holyoke, Mass.—An advance of 50 cents a day in the price of team hire will be charged the city during the coming year by the Team Owners' Association. During the last two years the rate has been $4.50 a day for a double team and driver. This year the rate will be $5 a day. The city hires some 20 horses and single carts and 10 drivers daily in the Alley Department and during six months of the year many other teams are hired for street and other work. The advisability of purchasing horses and carts will probably be discussed by the Mayor and Board of Public Works.

Curfew Ordinance with Interesting Provisions

Franklin, Pa.—According to the new curfew ordinance children under age of sixteen are forbidden to loiter, wander or stroll on streets, alleys or in other public places after 8 p. m. from October 1 of any year to April 30 of following year and after 9 p. m. from April 30 to October 1 unless accompanied by an adult person or having a card signed by parent or guardian. A bell or whistle, to be known as the curfew signal, is to be sounded fifteen minutes before the hours as a warning. Any policeman, constable or other peace officer is authorized to arrest children coming under the provisions of the ordinance. The first time the child is to be taken home and the parents notified. In case of subsequent offenses parent or guardian of the offending child is to be fined not less than $2 nor more than $25. The new section, thought by many to nullify the whole ordinance, reads as follows: "Section 4.—The Mayor shall have power to suspend the provisions of this ordinance when in his opinion certain temporary conditions warrant such suspension, for such time only as the warranting conditions exist."

Curfew Law "Unnecessary, Unjust, Unfit"

Williamsport, Pa.—Mayor Charles D. Wolfe has vetoed a curfew law adopted by Council as "unnecessary and unjust and unfit to be imposed upon our free, intelligent, highly moral and self-respecting citizenship." He said further: "And if it is legal to arbitrarily fix the hour when parents must take their children off the streets, can it not, logically, be decided at what hour they may again permit them to reappear upon the streets?"

City Weigher Makes Profit for City

Knoxville, Tenn.—The office of the City Weigher in the city government is more than self-sustaining. The costs of this department is about $1,200 a year and the receipts for last year were $2,037.55. The following is the report of Jacob Staub, Weigher:

Number of cattle weighed	14,203
Number of sheep weighed	1,239
Number of lambs weighed	2,094
Number of hogs	5,364
Stock drafts	6,655
Hay drafts	1,639
City drafts	401

Civic Center for Milwaukee

Milwaukee, Wis.—The civic center has been planned for Milwaukee, which will start with the City Hall, include the Public Library and Museum Building at its southwest extremity, and extend as far north as State street. Almost at its center the Auditorium Building will stand, and at either side, with well-lighted boulevards, the Municipal and County Buildings will trail away, until they meet with the large residence district of the west side. In addition there will be other centers, situated where they may best meet with the needs and requirements of the portion of the city they represent, in which will be erected public libraries and other necessary structures. In addition to these artificial aids, the natural physical beauties of Milwaukee will be included in the chain, including Lake Park to the northeast, Juneau Park to the east, Humboldt and Kosciusko, Washington and Reservoir Parks, with other smaller oases in the builded section. To connect all of these a system of broad voulevards is invoked.

Improvements in Seattle

Seattle, Wash.—According to the report of City Engineer R. H. Thomson, between December 1, 1908, and November 30, 1909, local improvement work at a cost of $7,277,451.59 was done. Local improvements made since 1890 have amounted to $28,187,065.58, showing more than 25 per cent of this total was done in 1909. During the year, 11.95 miles of planking has been laid, making a total of 82.69 miles; 3.55 miles of cluster lights were added, making a total of 4.47 miles; 63.93 miles of street were graded, making a total of 448.26 miles; 146.95 miles of walk were laid, bringing the total to 751.88 miles; 56.50 miles of sewer were laid, making a total of 270.05 miles; 53.36 miles of water mains were laid, making a total of 449.52 miles; 30.33 miles of streets were paved, making a total of 110.07 miles. In closing the report Thomson endorses the plan for a civic plans board.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Competitive Bidding—Conformity with Specifications

Case vs. Inhabitants of Trenton et al.—Where a statute requires competitive bidding in awarding a contract for public work, each bidder should be compelled to conform to every substantial condition imposed upon other bidders in presenting his proposals, so that all bidders shall be put upon the same footing. The award of a contract to a bidder who fails to give a description of the properties of the asphalt to be used and the proportion of the several ingredients in the wearing surface of a street pavement, as required by the conditions upon which bidders are to present proposals, held illegal.—Court of Errors and Appeals of New Jersey, 74 A. R., 672.

Pollution of Streams—Nuisance—Remedy

Little et al. vs. Town of Lenoir.—A municipal corporation has no more right to injure the waters of a stream or the premises of an individual by the discharge of sewage into the stream than a natural person, and incurs the same liability by so doing. Where the evidence is conflicting and leaves in doubt the question of injury to abutting owners from the discharge of sewage into a stream by a city, it is proper to refuse an injunction against the construction of the sewer and leave plaintiffs to their remedy in damages.—Supreme Court of North Carolina, 66 S. E. R., 337.

Obstruction in Street—Action—Pleading

City of Greenfield vs. Roback.—A complaint, in an action against a city for injuries received by falling over an obstruction on a sidewalk, alleged that plaintiff was walking along a cement walk four feet wide; that the night was dark, and that the sidewalk was not lighted; that there were no guards along the sidewalk; that plaintiff tripped over a piece of timber leading from said walk to a residence on an adjacent lot, which projected over said walk at least 5½ inches; that said obstruction had existed for more than six months, with the knowledge of defendant and its officers, and for a sufficient length of time for them to have remedied the defect. Held, that the complaint does not aver facts showing negligence with requisite certainty, and a demurrer to it should have been sustained.—Appellate Court of Indiana. 90, N. E. R., 136.

Special Assessment—Inconsistency in Ordinance

City of Chicago vs. Wilshire.—The recommendation of the Board of Local Improvements and the estimate of the engineer provided for an improvement of a street named between two points, with the exception of the roadways of certain intersecting streets named, and the title of the ordinance contained the same exceptions. The intersections were expressly excepted from those sections of the ordinance relating to the paving, curbing and guttering; but the sections of the ordinance relating to the improvement of the roadway of the street did not contain the exceptions. Held, that the inconsistency in the ordinance is not sufficient to render an assessment under it invalid, as the title may be considered in determining the construction to be given to the ordinance, and if it is susceptible of two constructions, one rendering it invalid and the other valid, that construction which sustains the ordinance will be adopted.—Supreme Court of Illinois. 90, N. E. R., 245.

Civil Service—Removal of Police Officer

People ex rel. Gersch vs. City of Chicago et al.—A public officer has no property rights either in his office or the salary attached thereto so that his deprivation of such right by his removal from office would be unconstitutional, as taking property without due process of law. Civil Service Act, prohibiting the removal of officers appointed under the rules of the Civil Service Commission except for just cause and for reasons given the commission in writing, and with an opportunity to be heard, did not prohibit the removal of a police desk sergeant not so appointed, without written charges or a hearing.—Supreme Court of Illinois. 90, N. E. R., 259.

Municipal Corporations—Liability for Negligence

Schwalk's Administrator vs. City of Louisville.—A municipal corporation in maintaining a City Hall for the use of its officers and agents as a place for transacting its business performs a public and governmental duty, and is not liable for the negligence of its agents and servants in the transaction of such business. That municipalities are liable for negligence in not keeping their streets in repair affords an exception to the general rule exempting municipalities from liability for negligence in the performance of a public, governmental duty imposed upon them for public benefit, and for which they in their corporate capacity derive no pecuniary profit.—Court of Appeals of Kentucky, 122 S. W. R., 860.

Civil Service—Firemen—Promotion

In re Beck.—Greater New York charter provides that promotions in the public service shall be made as prescribed by the Constitution and the civil service law. Section 728 provides, in regard to the Fire Department, that promotions shall be made by the Fire Commission as provided in Section 124, on the basis of seniority, meritorious service, etc., as shown by competitive examination, and that the Fire Commissioner shall transmit to the Municipal Civil Service Commission in advance of examination a complete record of each candidate for promotion. Section 739 empowers the Fire Commissioner to adopt rules for the government of the Fire Department. Under the rules adopted, provision was made for investigation of the meritorious acts of firemen, and Municipal Civil Service Commission Rule 9, paragraph 5, provides that no examination paper, or record, or part of an examination, shall be subject to review, or rerating after the marks of the examiners have been registered. Rule 15 provides that conduct, seniority and efficiency in previous service shall be determined from the efficiency record between the date of the original appointment of the candidate and the final date of receiving the application for any stated examination. Held, that the Commission is limited to the record as it exists at the time of the examination, and that the efficiency record cannot be changed to increase the standing of a candidate because of the subsequent recognition by the Commission of meritorious acts performed by him. That the Board made a mistake regarding a candidate, and gave him the benefit of meritorious acts not recognized until after the examination did not accrue to the benefit of another candidate and entitle him to credits under similar circumstances.—New York Supreme Court. 119, N. Y. S., 1028.

Injury—Notice—Wrong Date

Ouimette vs. City of Chicago.—Under section of the statute as to personal injury suits against a city, providing that within six months after the accident notice shall be filed giving details of the accident, including "the date and about the hour" it happened, and providing that if the notice shall not be filed any such suit brought shall be dismissed, filing a notice with a wrong date of the accident has the same effect as if no notice was given, though the city is not misled.—Supreme Court of Illinois. 90, N. E. R., 300.

Creation of Offices—Building Inspectors

State ex rel. Stage vs. Mackie.—Charter City of Waterbury, authorizing the Board of Aldermen to provide for the appointment or election of such employees as are not otherwise provided for and as may be required for the proper transaction of the business of a city and prescribe their duties and compensation, did not confer authority on the Board to create public offices, to provide for the choice of incumbents, and to endow such incumbents with portions of the sovereign power at pleasure, such provision being limited in its application to employees, and hence it did not authorize the creation of the office of Deputy Building Inspector.—Supreme Court of Errors of Connecticut. 75 A. R., 760.

Defects in Sidewalks—Notice

City of Mayfield vs. Hughley.—Where it was shown that an excavation, which lowered a sidewalk and allowed an obstruction to protrude, over which plaintiff fell, was made about three months prior to the accident, the city was chargeable with notice of the obstruction.—Court of Appeals of Kentucky, 122 S. W. R., 839.

NEWS OF THE SOCIETIES

South Carolina Good Roads Association.—The eleventh annual convention of the association was held in the House of Representatives, Columbia, January 18. Several hundred delegates were in attendance. The welcome to the city of Columbia was delivered by Mayor Reames, on behalf of the State by Lieutenant-Governor McLeod, and for Richland County by F. H. Weston. C. M. Garris spoke on "The Government and Its Relation to Transportation." Prof. F. Horton Colcock and Dr. S. C. Mitchell, both of the University of South Carolina, spoke. The annual report of President Hyatt was read. Joseph Pratt, Highway Commissioner of North Carolina, spoke of the work accomplished in his State. D. H. Winston, United States Office of Public Roads, gave some practical suggestions as to road improvement. Highway Commissioner Watson presented data he had collected from the county officials. He said there were 40,000 miles of roadways in the State. He recommended the appointment of a Highway Engineer. Resolutions were passed urging the General Assembly to provide for a State Highway Commission and to give the Commission the proceeds from automobile licenses and fines.

Good Roads Contractors' Association of New York.—Representatives from more than 60 firms engaged in paving and road building attended the first meeting of the Good Roads Association, held in Albany, January 21. An effort will be made by the association to lower the rates of the bonding companies, as well as to perfect the road building industry. The following officers were elected: President, A. J. Rockwood, Rochester; vice-president, T. C. Brown, Schenectady; treasurer, Joseph Walker, New Paltz; trustees for one year, Patrick Murray, Rochester; F. L. Cohen, Buffalo; W. H. Gailor, Saratoga; C. H. Flannigan, Albany.

Civil Engineers of Erie County, Pa.—A county organization of the civil engineers was formed January 25 at the City Hall, when nine engineers gathered and selected City Engineer B. E. Briggs chairman and L. V. Metz secretary. On a committee appointed to formulate by-laws and a professional code and report at the next meeting were named: I. H. P. McCreary, the County Surveyor; William Supplee and Charles E. Cranch. The engineers decided that they would have a permanent county organization after the committee reports at the next meeting, to be called by the chairman. Later the organization will no doubt be affiliated with the Engineers' Society of Pennsylvania, of which John Price Jackson, of State College, is the president. At the last State meeting of the society a convention section was organized and a chairman named for each county, to get a movement under way by which the engineers are to secure legislation and have an official code throughout the State so that a standard of efficiency can be obtained and those legally entitled to practise be protected from impostors.

Utah Society of Engineers.—At the monthly meeting in the society room, 702 Newhouse Building, Salt Lake City, January 21, the topic of the evening was "Pumps and Pumping." Prof. E. H. Beckstrand and A. O. Gates led the discussion.

Montana Society of Engineers.—At the recent meeting of the society Prof. Clinton H. Moore offered the following resolution, which was adopted: "That a commission of three engineers from this society be named as a commission by our presiding officer between now and the next meeting in February, that this commission be authorized and instructed to formulate a plan and method for the construction of a State road within the confines of this commonwealth. That this society place at their disposal the sum of not exceeding $200 for placing the plan in execution. That this commission be required to meet at stated times, subject to the call of the chair; shall consult authorities which can readily be secured; shall correspond with various State road commissions throughout the Union, as far as they may find it expedient and necessary; that they shall present this matter to the Governor of their commonwealth; secure, if possible, his cooperation on this subject by the appointment of a joint commission or the approval of the commission which our chairman shall name. That at the close of this year of this society said commission shall report back to us its doings, its expenses and the prospects of success, and even carry their work so far as to attempt to interest members of the Legislature to secure State legislation along these lines. Also, that this committee be instructed, if possible, to secure the aid, financial or in any other way, of the various business committees throughout the State Boards of Commerce, wherever they may be, in order to successfully carry out the outline of this plan herewith presented."

Connecticut Society of Civil Engineers.—The society will hold its annual meeting—the twenty-sixth—in New Haven on February 8-9. The sessions will open at 10:30 on February 8, which will be the regular business session for election of officers, the meeting being held in North Sheffield Hall.

New England Water Works Association.—The February meeting of the association will be held at the Hotel Brunswick, Copley Square, Boston, on Wednesday, February 9, when the following papers will be presented: "Depreciation" (Water Works Accounts), by L. G. Powers, Chief Statistician, Department of Commerce and Labor, Bureau of the Census, Washington, D. C.; "The Purchase of Coal on Efficiency Basis," by A. O. Doane, Division Engineer, Metropolitan Water and Sewerage Board, Boston. A special meeting of the association will be held at Hartford, Conn., Wednesday, April 13. The June meeting of the association will be held at Providence, R. I., and the annual convention at Rochester, N. Y., September 14, 15 and 16. Willard Kent, of Narragansett Pier, R. I., is secretary.

Civil Engineers' Society of St. Paul.—The society held its annual meeting and banquet at the Commercial Club, electing J. D. Dushane, president; L. P. Wolff, vice-president; D. F. Ferguson, secretary, and Oscar Palmer, treasurer. George W. Cooley, Engineer of the State Highway Commission, told of the good roads of Europe and Governor Adolph O. Eberhart spoke to the engineers on the opportunities that lie about them locally in the development of water power now unused, the improvement of waterways and the betterment of wagon roads and railroads.

Indiana Sanitary and Water Supply Association.—Preliminary notices have been sent out by H. E. Barnard, president of the Indiana Sanitary and Water Supply Association, calling attention to the third annual meeting of the organization in Indianapolis February 25, when papers and discussions on the general question of water works problems and sewage disposal will make up the programme. Like organizations from neighboring States will be the guests of the Indiana organization during the meeting and at luncheon at noon and at a banquet at the Claypool in the evening. The following persons have thus far been placed on the programme: D. H. Maury, president of the Illinois Water Supply Association; Dr. Edward Bartow, member of the State Water Survey of Illinois; J. W. Alvord, Consulting Engineer, of Chicago; Mr. Meyer, head of the Wisconsin Public Service Commission; George W. Fuller and G. W. Johnson, both Consulting Engineers, New York; C. A. Brown, of the American Steel and Wire Company, Chicago; B. R. Richards, State Chemist, Ohio, and R. L. Sackett, Purdue University. The new anti-stream pollution law of this State will be another of the chief topics up for discussion. In addition to Mr. Barnard, the following are the officers of the Indiana organization: Vice-presidents, Dow R. Gwinn, of Terre Haute; Howard A. Dill, of Richmond; B. F. Von Behren, of Evansville; Quince Walling, of Muncie, and Severance Burrage, of Lafayette; secretary, Frank C. Jordon, of Indianapolis; treasurer, George A. Fletcher, of Brazil.

Southern Gas Association.—An attendance of 200 is expected at the convention, Chattanooga, Tenn., February 17-18. James Ferrier, president of the Rome Municipal Gas Company, Rome, Ga., secretary of the association, is chairman of the committee of arrangements. The Southern Gas Association is only about a year old. Its membership is made up principally of managers and superintendents of gas plants in the Southern States east of the Mississippi and south of the Ohio rivers. The principal business of the annual meeting is the reading of papers on and discussion of topics timely in the gas producing business, affecting methods of manufacture, distribution, office problems and competition.

Utah Good Roads Convention.—At the convention at Salt Lake City, January 26-28, the following programme was carried out:

January 26—Convention called to order by Governor William Spry. Invocation by Rev. E. I. Goshen. Address of Welcome by Mayor Bransford. Reports of the vice-Presidents of the Good Roads' Association. Afternoon Session—Paper by Robert C. Skelton, "The Advantages of Good Roads in the Eastern States as Compared with the Poor Roads of the West." Open discussion. Report of the Vice-Presidents of the Good Roads' Association.

Second Day—Paper by E. H. Beckstram, "The Best Material for Utah Road Building." Open discussion. Paper by Caleb Tanner, State Engineer, "The Good Roads Bills Passed by the Last Legislature, Their Benefits to the State and How to Carry them Out." Open discussion. Afternoon Session—Paper by Prof. John E. Widtsoe, "The Earth Road." Open discussion. Report of the Vice-Presidents of the Good Roads' Association.

Third Day—Representatives of the public roads of the United States Department of Agriculture, Washington, D. C. Open discussion. Paper by representative of Idaho, "What Is Idaho Doing for the Betterment of Its Highways?" Afternoon Session—Report of Committee on Resolutions. Election of permanent officers. Unfinished business.

International League for Highway Improvement.—A preliminary feature of the first annual convention of the league, St. Augustine, Fla., January 26-27, was an illustrated lecture by L. W. Page, Director of Public Roads, Department of Agriculture, delivered in the Jefferson Theater. The official session was opened by President Meserve, of the Board of Trade, who introduced Mayor Masters, who welcomed the delegates. General J. C. R. Foster, Adjutant-General, welcomed the convention in behalf of the State. Col. John A. Stewart, New York, president of the league, responded. The committee on resolutions introduced the bill which it is the main object of the league to have passed by Congress. This provides for a National Commission on Highway Improvements to be composed of nine members. The duty of the commission will be to survey routes for interstate highways, 24 feet wide, which, while constituting a national system, may conform with roads now in existence. Experiment in building sections of roads with various materials are to be undertaken and funds provided for the purpose. Provision is made for bringing about a convention of proper authorities of Canada, Mexico and Central America, with a view to arranging for connecting roads. The sum of one million dollars is suggested as a means for carrying on the purposes of the act. This bill was approved by the convention and adopted. At the concluding session Col. Black gave an interesting talk on road building as it relates to the War Department. He advocated placing road building under the War Department. Under the existing conditions, he said, foreign governments had better plans of our roads than did the authorities at Washington. A resolution was passed endorsing the work done by the Bureau of Roads under Dr. Page and asking him to prepare a form of bill embodying his ideas of administration and management so that the bill may be presented to the Governors of the States with recommendations that it be presented to their respective legislatures. The meeting closed with a banquet at the Alcazar. It was decided to hold the next annual convention in Washington, D. C.

American Society of Plumbing Inspectors and Sanitary Engineers.—The following officers were elected in its final session of the convention at Trenton January 22: President, William G. Williamson, Chief Plumbing Inspector of Detroit, Mich.; first vice-president, Edward F. Kane, Chief Plumbing Inspector of Wilmington, Del.; secretary-treasurer, Thomas J. Claffey, Supervising Inspector of the Chicago Health Department; trustees, Charles B. Ball, of Chicago; Edward Quinn, of St. Louis, and A. C. Shaver, of Pasadena, Cal. Milwaukee, Wis., was selected as the place for the next annual convention. City Engineer Swan gave an address on "The Relationship Between Plumbers and the City Engineer." In the evening the delegates enjoyed a banquet at the Hotel Windsor. Addresses were delivered by John A. Campbell, Francis B. Lee, Charles B. Ball, of Chicago; J. J. Cosgrove, of Philadelphia; Harry De Joannis, of Philadelphia; A. C. Shaver, of Pasadena, and Thomas B. Holmes, of Trenton. The toastmaster was James Heatherton, of New York. The delegates endorsed a bill now before the Ohio Legislature, providing for the establishment of a State inspecting bureau of plumbing.

Georgia Federation of Road Authorities.—A convention will be held February 9 at the House of Representatives, Atlanta. Among the speakers who will address the convention are: Governor J. M. Brown, Hon. G. R. Hatcher, Chairman Prison Commission; Hon. L. W. Page, Director of Road Inquiry of the United States Government; Prof. C. H. Stra[illegible]n, University of Georgia; Hon. Geo. [illegible]e T. Cann, Savannah, and Hon. Clark Howell, president of the Georgia Automobile Association. Work will be planned at the convention for road improvement during this year.

International Municipal Congress.—The City Council has endorsed the Chicago Association of Commerce project for an International Municipal Congress and Exposition in Chicago in the fall of 1911. The plan is to invite all the cities in the world to send exhibits and participate in a discussion of municipal affairs. Exhibits pertain to street construction, lighting, power plants, sanitation, civic art, taxes, liquor traffic, treatment of crime, etc.

International Association of Fire Engineers.—President Horton has called the directors to a meeting in Syracuse, N. Y., Tuesday, February 22, at 12 o'clock noon to select the time and arrange a line of topics and other arrangements for the annual meeting to be held this fall. James McFall is secretary.

Port Norfolk Civic League.—Charles W. Steele, secretary and treasurer of the Air Line Manufacturing Company, has been elected president of the Port Norfolk Civic League, of Portsmouth, Va. W. A. Pollard has been chosen for the vice-president and Charles Reed has been re-elected secretary and treasurer of the organization, which has accomplished much good work toward civic improvement in Port Norfolk. Since its inception the league has launched several improvement movements, in the interest of better streets and conditions.

Calendar of Meetings

February 7-12.
National Brick Manufacturers Association.—Annual convention, Pittsburg, Pa.—T. A. Randall, Secretary, Indianapolis.

February 8.
Connecticut Society of Civil Engineers.—Annual meeting, New Haven, Conn.—J. Frederick Jackson, Secretary, Box 1304, New Haven, Conn.

February 8-10.
Ohio Engineering Society.—Annual meeting, Columbus, O. C. J. Knisely, Secretary, New Philadelphia, O.

February 16.
New England Association of Gas Engineers.—Annual meeting, Boston, Mass. N. W. Gifford, Secretary, 26 Central Sq., E. Boston, Mass.

February 16-17.
Iowa Engineering Society.—Annual Convention, Cedar Rapids, Ia.—A. H. Ford, Secretary, Iowa City, Ia.

February 18-21.
Northwest Cement Products Association.—Sixth Annual Convention, Great Northern Hotel, Chicago.—L. V. Thayer, Chairman Committee of Arrangements, Minneapolis, Minn.

February 21-25.
National Association of Cement Users.—Annual meeting, Chicago, Ill.—Geo. C. Wright, Secretary. Address communications to Edw. E. Krause, Asst. to President, Harrison Bldg., Philadelphia, Pa.

February 23-25.
Engineering Society of Wisconsin.—Second annual meeting at Milwaukee, Wis.—W. G. Kirchoffer, Secretary, 31 Vroman Bldg., Madison, Wis.

February 24-26.
American Society of Engineering Contractors.—Annual convention, Chicago, Ill. Daniel J. Hauer, Secretary, Park Row Building, New York City.

February 24-26.
Illinois Association of Municipal Contractors.—Annual meeting, Chicago, Ill.—Orie T. Dunlap, Secretary, Edwardsville, Ill.

PERSONALS

ANDERECK, ARMAND, Kankakee, Wis., has been appointed City Clerk, succeeding Harry Sylvester, resigned.

BLAKE, HENRY T., New Haven, Conn., has been re-elected President of the Park Commission. The other members were also re-elected: Vice-President, William W. Farnam; Secretary and Treasurer, Henry F. English; Assistant Secretary and Treasurer, Rutherford B. Trowbridge; Superintendent, Gustave X. Amrhyn.

BODEKER, GEORGE H., Chief of Police, Birmingham, Ala., has been elected member of the Board of Directors, International Association of Police Chiefs.

BOSTICK, W. A., Van Buren, Ark., was elected Mayor at a special election.

BOWERS, GEORGE, City Engineer, Lowell, Mass., has been re-elected City Engineer over former City Engineer Frederick W. Farnham, after a hard fight in Council.

BROWN, CHARLES O., Haddonfield, N. J., has been elected Mayor, succeeding J. Morris Roberts, resigned. Mr. Brown was President of the Council.

CARROLL, J. E., City Engineer, Crookston, Minn., has been re-elected for a term of two years; he has filled the office since April, 1903.

HARRIS, SIMON B., Lowell, Mass., has been appointed City Marshal of Salem and confirmed by the City Council.

HAWKINS, W. D., Flowery Branch, Ga., has been elected Mayor.

HOGAN, WILLIAM J., Oswego, N. Y., has been appointed City Clerk by Mayor John Fitzgibbons. In a Civil Service examination held to fill the position Mr. Hogan stood highest, with a percentage of 89.5.

HOUSEHOLDER, CHARLES L., Alderman of Lonsdale, Tenn., has been elected City Recorder, and C. C. Walgaugh, has been chosen by members of Council to fill the Aldermanic vacancy.

HUSE, THOMAS, Newburyport, Mass., formerly Mayor, has been elected Chief Engineer of the Fire Department.

JOHNSON, ALEXANDER, New York, N. Y., has been appointed Chief Engineer, Department of Bridges, at a salary of $10,000.

JOYCE, JOHN, Mayor of Ashland, Wis., has resigned on account of ill health, and William C. Knowles, President of the Council, will be Acting Mayor for the next two years.

MODJESKI, RALPH, Chicago, Ill., F. H. Kindl, Pittsburg, Pa., and W. J. Sherman, Toledo, O., have been appointed members of an Engineering Commission to investigate merits of bids received last July for building a bridge across the Maumee River for the city of Toledo, O.

MORRIS, W. L., Miles City, Mont., formerly Assistant City Engineer of Great Falls, has been appointed City Engineer, at $175 per month.

MURPHY, JOHN P., Knoxville, Tenn., has been elected Mayor to fill the unexpired term of Mayor John M. Brooks, who was elected a member of the Board of Education and served one day.

PUFFER, WILLIAM L., Consulting Electrical Engineer, Boston, Mass., has removed his offices to 801-802 Boston Safe Deposit and Trust Company Building, 201 Devonshire street.

PROVINE, L. H., Assistant Superintendent of Buildings of Seattle, Wash., coming from the University of Illinois, has left the service of the city and entered the employ of the Stone & Webster Engineering Corporation, because the Finance Committee of Council reduced his salary from $250 to $200 a month.

PIERCE, DR. E. A., Mayor of White Castle, La., for nearly four years, has resigned, owing to his removal to Plaquemine, and Gus Weill, Mayor pro tem., will be Acting Mayor.

RALSTON, JAMES, Martins Ferry, O., has been elected Chief of the Fire Department, vice Heyward Lay, who has become Mayor of the city, and who, notwithstanding efforts to induce him to continue as Chief, declined to hold both offices.

RICHARDS, J. M., Italy, Tex., has been elected President of the Fire Department and H. C. Martin, Chief.

RINEHART, Albert, Elkhart, Ind., has been elected Superintendent of Police.

ROSE, DAVID L., Mayor of Milwaukee, Wis., has decided to locate in Seattle, Wash., to practice law, and is to be associated with Clarence A. Darrow of Chicago, the labor advocate.

RUSSELL, I. N., has been appointed Superintendent of Water Works, Salem, O., succeeding George L. Wells, deceased.

SHARP, J. W., Sanitary Officer of Ashland, Wis., has been named as Chief of Police.

SMITH, A. P., City Engineer of North Tonawanda, N. Y., has been reappointed.

SMITH, EDISON H., Indianola, Miss., has been elected Mayor over N. F. Chapman.

STEVENSON, A. J., Chief of the Fire Department of Bonham, Tex., for seventeen years, has resigned, and V. Deering has been chosen as his successor by the Members of the Department.

TAYLOR, L. D., Vancouver, B. C., has been elected Mayor.

VERMILLION, MARION, Lima, O., has been appointed Chief of Police.

WEAVER, FRANK, Hamilton, O., has been appointed City Engineer.

WEBSTER, DR. GEORGE W., Chicago, Ill., has been re-elected President of the State Board of Health, and Dr. James A. Egan, Springfield, Secretary.

NEW OFFICIALS ELECTED OR APPOINTED

Evansville, Ind.—Mayor, Charles F. Heilman; City Clerk, Harvey Weber; City Engineer, August Pfafflin; Street Commissioner, M. W. Foster; Chief of Police, George L. Covey; Fire Chief, U. S. Grant; Assistant Fire Chief, Charles Wilder; Controller, J. M. Kollmyer; Board of Jublic Safety, Walter M. Schmitt, Nicholas Althaus and James T. Walker; Board of Public Works, S. G. Rickwood, J. E. Stickelman and Edward Schmitt; Clerk, Gordon B. Allis; Board of Water Works, John Jack, Edward Heberer and M. J. Bray; Clerk, Henry Heilman; Superintendent of Water Works, John W. Peck.

Eveleth, Minn.—City Clerk, D. P. McIntyre, reappointed; City Attorney, James P. Boyle, reappointed; Superintendent of Water Works, F. E. Forstell, appointed over the present superintendent, C. Vandell; Chief of Fire Department, William Nellon, reappointed; Street Commissioner, Andrew Joula, appointed over Commissioner John Warn; Chief Police Department, Nicholas Kent, the present incumbent.

Fort Wayne, Ind.—Mayor, Jesse Grice; City Clerk, William T. Jeffries; City Attorney, Harry G. Hogan; City Engineer, Frank Randall; City Controller, Sherman Cutshall; Deputy, Theophile Kucher; Secretary of Water Works, Martin Detzer; Board of Public Works, Frank Benoy, chairman; Henry Hilgeman and E. J. Lennon; Board of Public Safety, Joseph C. Hutzell, chairman; Marion B. Johnson and W. D. Henderson; Clerk of Board, Henry Becker.

Frankfort, Ind.—Mayor, Dr. O. W. Edmonds; City Clerk, Charles Cohee; Treasurer, Harry Van Eaton; City Engineer, Felix Coble; Street Commissioner, Henry Wolf; Chief of Fire Department, Link Rebstock; Chief of Police, L. S. Baker.

Georgetown, S. C.—Mayor, W. H. Andrews; Aldermen, F. L. Siau, W. W. Munnerlyn, H. W. Fraser and L. Brinkley; Corporation Counsel, James W. Wingate, to succeed Walter Hazard; Chief of Police, L. L. Bolick, to fill the vacancy caused by the death of R. W. Rouse; Chief of the Fire Department, Ned Doar; Assistant, Walter McDonald; City Clerk, Capt. W. A. Black.

Kaysville, Utah.—Marshal, Samuel Rushford; Street Supervisor, Charles Odd; Water Master, Orton A. Williams; Members of the Board of Health, John Barton, William E. Smith and Dr. Sumner Gleason.

Knoxville, Tenn.—City Engineer, J. Edgar Thompson, vice S. D. Newton; City Recorder, Wm. P. Chandler; City Attorney, J. Pike Powers, Jr.; City Comptroller, Wm. M. Ashmore, vice W. D. White; City Physician, Dr. Henry A. Smith; City Weigher, Jacob Staub; Sealer of Weights and Measures, John Dempster; all re-elections except as noted.

Malden, Mass.—City Engineer, Henry W. Estey; Street and Water Commissioner, Frank H. Carlisle; Inspector of Buildings, Frank A. Conner; Sealer of Weights and Measures, William E. Dunn; Acting Chief of Police, Timothy J. Foley; Fire Commissioner, Thomas W. Hough; Inspector of Electric Lines, Herman A. Morse.

Michigan City, Ind.—City Engineer, H. M. Miles; Controller, W. H. Fink; Attorney, W. W. Pepple; Commissioner Board of Public Works, R. C. Fedder.

Morganfield, Ky.—Marshal, Van Snodgrass; Street Commissioner, Henry Veach; City Attorney, Elliott R. Morton; City Clerk, A. F. Waller; Chief of Fire Department, Arch Walker; Superintendent Water Works, Mose Tudor.

Muncie, Ind.—City Clerk, John Kelly; City Attorney, Adolph C. Silverburg; Chief of Fire Department, John Casey, reappointed; City Engineer, Benjamin W. Deardoff, vice John O. Potter, declined; Board of Public Safety, Alfred W. Davis, Milton Retherford and Charles Emerson.

Ogden, Utah.—City Engineer, W. M. Bostaph; Chief of Police, Thomas E. Browning, the incumbent; Sanitary Inspector, Moroni Poulton; Street Inspector, T. W. Jones.

Paducah, Ky.—Board of Public Works, re-elected for two years, Richard Rudy, Louis Kolb and Finis E. Lack; Richard Rudy, President; Louis Kolb, Secretary; Street Inspector, E. B. Bell.

Princeton, Ind.—Mayor, Dr. D. A. Davidson; City Clerk, Will R. Lamb, vice Charles Wesley Benton, who served 23 years; Chief of Police, Dan J. Haley; Chief of Fire Department, Sam McDonald; Street Commissioner, John Y. Brown.

Sussex, N. J.—President of the Council, A. W. Bedell; Clerk, Harry E. Wells; Counsel, Judge Henry C. Hunt; Water Superintendent, Seely F. Quince; Recorder, Irvin D. Shorter; Marshal, Moses Green; Street Commissioner, William Storms; Fire Chief, Arthur C. Williams.

Three Forks, Mont. — Mayor, William Parnacott, 39 votes, and Thomas J. Candler, 38; Aldermen, J. C. Menepace, R. W. Thomas, C. A. Ellison and C. M. Bryant for the Second Ward.

Youngstown, O.—Director of Service, Herman F. Duesing; Director of Safety, James Quinn; Street Commissioner, William F. Sullivan; City Engineer, Frank M. Lille; Superintendent of Sewers, David L. Stemple; Park Commissioners, James P. Wilson, James Green and Alfred Liebman; Assistant City Engineer, Singleton King.

TRADE NOTES

Cast-Iron Pipe.—Chicago: Inquiries for both water and gas pipe are good. Quotations: 4-inch, $28.50; 6 to 12-inch, $27.50; 16-inch and up, $26.50. Birmingham: A fair number of small orders have been entered recently at rates higher than the published prices. Quotations have a tendency to advance. Quotations: 4 to 6-inch, $25; 8 to 10-inch, $24; over 10-inch, average, $23. San Francisco: Orders are coming in better than last month, principally from water and gas companies.

Lead.—Lead seems to be holding its own and prices are somewhat firmer. The American Smelting and Refining Company is asking 4.70c. in this market, while outside interests are demanding and getting 4.72½c. The St. Louis market is at 4.60c., and it is somewhat softer than New York. Spot lead is said to be quite scarce and some fair-sized quantities are being asked for.

Street Signs.—The Ingram-Richardson Manufacturing Company, Beaver Falls, Pa., has issued a very attractive folder, giving colored reproductions of the Ing-Rich Everlasting Porcelain Enameled Iron Street and Traction Signs. These signs are made of heavy iron plate, fused at 1,600 degrees heat with several thick coats of genuine porcelain enamel, which, when cold, is as hard as flint. Doubters are invited to satisfy themselves on this point by taking a penknife and trying to scrape or scratch the enamel.

Voting Machines. — The National Voting Machine Company, Adrian, Mich., issues a booklet describing their voting machine, with the various improvements made to date, intended to overcome the objections made to the original designs. The saving of time in counting ballots and the quick returns which it is possible to give are among the chief merits of the voting machine.

Clay Products.—The Denver Sewer Pipe and Clay Co., 611 Continental Building, Denver, Col., works Argo, Col., issues a neat booklet giving a description and price list of their products. These include: Sewer pipe and fittings; well curbing; split or conduit pipe; farm drain tile; grease traps; fire brick; fire box tile; fire clay tile; chimney pipe; flue lining; hollow partition tile; building brick; vitrified paving and sidewalk brick.

Industrial Vehicle.—The "Orion" industrial motor vehicle, which is suitable for contractors' use, and is claimed to be a cheaper means of hauling, especially if the hauls are long, than horse-drawn trucks, is made by the Automobil-Fabric Orion, Zurich, Switzerland. Henry Ducasse & Co., 735 Seventh avenue, New York, are the sole agents in the United States. The vehicles are made with carrying capacities of from one to five tons. Wagon bodies in various styles, including end dumping, are made. The body sets low and is therefore easy to load. One of these trucks was recently used by the New York Street Cleaning Department for hauling snow and the results accomplished were very satisfactory.

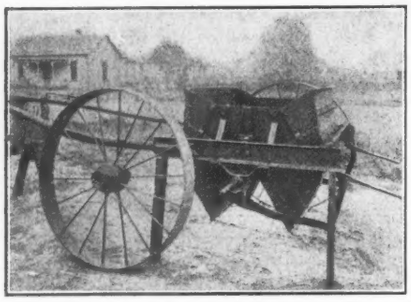
Water Purification by Ozone.—The United Water Improvement Company, 1206 Pennsylvania Building, Philadelphia, Pa., issue a pamphlet describing in non-technical way the merits of their process. An introduction discusses the general question of impurities in water, even that which is commonly supposed to be pure, and goes on to enumerate the possibilities of failure of sand filters and household devices to do the work for which they are designed. Coming to the subject of ozone, the successful use of this form of oxygen for water purification in fourteen towns and cities of France, including Paris and Nice, is mentioned. The method used by this company for applying ozone calls for the use of devices which require the application of a high-tension electric current. The smallest of these is a "Spigot Sterilizer," capacity 1,200 gallons in twenty-four hours, for domestic use in connection with a single faucet. The "Domestic Sterilizer" has a capacity of 3,000 to 5,000 gallons per day and will treat the water for a whole house or small hotel. For capacities ranging from 5,000 gallons to 240,000 gallons in twenty-four hours, suitable for a large building or small town, a "special apparatus" is made. A "Municipal Apparatus" of unlimited capacity is designed with special reference to the requirements of the city in which it is to be used.

Fire Hose.—Owing to the increased cost of cotton and rubber, the manufacturers of fire hose will be obliged to advance their price on hose at least 10 cents per foot.

MUNICIPAL APPLIANCES

Spreading Dump Cart

A SPREADING dump cart made particularly for handling concrete, but adaptable to other purposes, such as spreading macadam or for fine grading, has been placed on the market by the Goit Manufacturing Company, Inc., Oklahoma City, Okla. The form of the body and the operation is similar to the clamshell bucket; the mechanism, however, is different in that each of the quadrants forming the body has an individual axis upon which it revolves when released by the dumping lever. The spread of the quadrants when in dumping position is 21 inches, which is one-half of the measurement of the full spread of the top sides of the body



CONCRETE DUMPING CART

when loaded. The body is made of No. 10 steel plates, riveted to angle iron reinforcing. The ends of the quadrants are reinforced with steel bars ¼ inch x 3 inches, welded at 90 degrees and riveted, forming a joint which is practically watertight. The panel plates which secure the quadrants in their proper position are bracketed to the axle and braced to the frame. All pivot points and bearings are pendant and supplied with rollers which eliminate wear and friction. The frame axles, wheels and shafts are substantial and suited to the purpose. The capacity of the cart is 21 cubic feet when level full. The shipping weight is 850 pounds; wheels are of standard track and will carry a load of 2,500 pounds. The wheels have 5-inch tires.

GASOLINE FURNACE

APHRODITE—ORNAMENT IN CEMENT
Decorations on keystone above entrances to Chelsea Docks

Ornamental Cement Work

ORNAMENTS of pressed cement used in the decorations of the Chelsea Dock Improvement, New York, N. Y., are described and illustrated in the January number of the Edison Aggregate, a pamphlet issued by the Edison Portland Cement Co., New Village, N. J. The model representing "Navigation," surmounting the apex of the pediment over each of the entrances of the piers, is a particularly handsome and complicated design, representing instruments, anchors, etc., common to navigation, while on the two lower corners of the pediment are elaborate ornaments of pressed cement, showing land commerce, with products of the soil, and marine commerce, with chart, compass, fish nets, shells, etc. The keystones over the smaller arches are embellished with ornaments symbolic of Mercury, while the suggestion of "entrance" and "exit" appears in the extended and folded wings of the ornaments. Neptune and Aphrodite form the decorations on the keystone above the entrance to each of the piers, the two alternating along the line. The ornamentation of Edison Portland cement was executed by H. W. Miller, of 501 East Twenty-second street, New York City, from designs of Warren & Wetmore, architects, of 3 East Thirty-third street, New York City. The facings of the piers are also made of Edison Portland cement, as are the street side or curtain walls, which are claimed to be among the most elaborate examples of concrete construction in the world, the concrete being 1 : 2 : 4. A full illustrated account of the Chelsea docks was given in the MUNICIPAL JOURNAL AND ENGINEER of November 3.

Leadite Gasoline Furnace

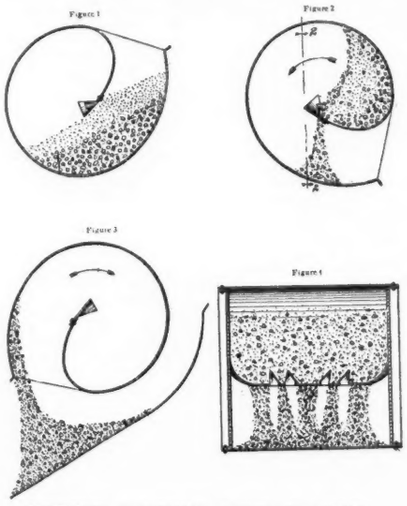
THIS furnace is specially adapted for melting Leadite, as the heat can be regulated just as it is wanted. The furnace is safe and non-explosive. The tank, or reservoir, is protected from the heat by a shield, which allows the air to circulate freely over it, thereby keeping it perfectly cool. It is light and compact, which permits of it being easily moved as work progresses. The tank, or reservoir, is made of 24-ounce copper and is thoroughly inspected and tested by experienced workmen. All parts are made durable and interchangeable. This melting apparatus, it is claimed, will soon pay for itself by the saving effected in labor and fuel over the old-style coal, coke or wood fire. You can start it when you want to use it, and turn off the fire when it is not needed. This is also an excellent furnace for melting lead.

The dimensions of the furnace are: Height, 30 inches; diameter, 18 inches; number of burners, 4; capacity of reservoir, 4 gallons; weight—crated for shipment, 170 pounds; capacity of melting pot—leadite, 50 pounds; lead, 325 pounds.

The furnace is made by The Leadite Company, Inc., 1232 Land Title Building, Philadelphia, Pa.

National Concrete Mixer

A BATCH concrete mixer which mixes concrete principally through the peculiar shape of the drum, and consequently has no chains, blades or paddles, is put on the market by the National Concrete Machinery Company, Security Building, Chicago, Ill. A cross-section of the drum shows a spiral outline. The outer edge overlaps the inturned edge to form the opening. When running in the right direction for mixing, none of the material will fall out, but will repeatedly roll around and fall from the inturned edge to the outer side until it is thoroughly mixed. The inturned edge is sometimes provided with teeth which promote rapid mixing and gives the concrete an endwise motion. When the mixing is complete, which takes from five to ten revolutions, the motion of the drum is reversed and the batch instantaneously discharged. On account of the form of construction, including suitable bearings, the drum may be revolved as fast as 30 revolutions a minute. The illustrations show the construction and operation. Figure 1 is a cross-section cut through the middle and shows it in filling position. Figure 2 is a similar view, showing the drum as it is being revolved in the proper direction for mixing. Figure 3 is also a similar view, showing the position as it is reversed for discharging. Figure 4 is a longitudinal sectional view, as indicated by the line 2-2 of Figure 2, and looking in the direction indicated by the small arrows. This figure shows the operation of the toothed plate which is attached to the inturned edge of the drum and which acts to throw the material lengthwise of the drum.



SECTIONS, NATIONAL CONCRETE MIXER

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals

It is our purpose to give in the first issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles, where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS

Public Roads Situation in the South. By J. H. Pratt. Illustrated, 2 pp., Manufacturers' Record, Jan. 6. 25 cts.

Construction and Maintenance of County Highways. By F. C. Evans. 1 p., Good Roads, January. 10 cts.

Roads of Multnonah County, Oregon. By M. O. Eldridge. 1 p., Good Roads, January. 10 cts.

The Roads of Rhode Island. By John Bristol. 1½ pp., Good Roads, January. 10 cts.

State Road Work in Maine. Paper before Good Roads convention. By Paul D. Sargent. 1 p., Good Roads, January. 10 cts.

Building Roads in North Carolina. Illustrated, 1¼ pp., Contractor, Jan. 1. 20 cts.

The Road Situation in the South. From paper before Southern Commercial Congress. By J. E. Pennypacker. 1½ pp., Contractor, Jan. 1. 20 cts.

Road Construction and Maintenance in Cumberland County, England. By G. J. Bell. 1 1/3 p., Engineering News, Jan. 27. 15 cts.

Road Construction and Drainage. By W. R. Goit. 2½ pp., Good Roads, January. 10 cts.

Road Construction in the Philippines. Illustrated, 1½ pp., Good Roads, January. 10 cts.

Difficulties on a Road Job Overcome. Plowing with a traction engine. Illustrated, 2 pp., Contractor, Jan. 15. 20 cts.

Experimental Road at Ithaca, N. Y. Illustrated, 5 pp., Good Roads, January. 10 cts.

Macadam Pavement, Constructing a, with Concrete Curb and Gutter, Manistee, Mich. 1½ pp., Engineering-Contracting, Jan. 26. 10 cts.

Cost of Producing Crushed Stone in Boston, Mass., by City Operated Plants. 3 pp., Engineering-Contracting, Dec. 29. 10 cts.

Use of Binding Material in Broken Stone Roads. Illustrated, 2 pp., Municipal World, January. 10 cts.

Oiling of Roads. Account of three years' experience. From paper before American Society of Municipal Improvements. By F. A. Reimer, City Engineer, East Orange, N. J. ¾ p., Surveyor, Jan. 14. 20 cts.

Bituminized Roads at Morristown, N. J. 1½ pp., Good Roads, January. 10 cts.

Paving in Carlisle, Pa. Brick pavement on macadam base. Asphaltic and tarviated macadam. Methods and cost of construction. ½ p., Municipal Journal and Engineer, Jan. 26. 10 cts.

Data on Street Work at New Bedford. 1½ pp., Engineering-Contracting, Jan. 19. 10 cts.

Asphalt Pavement, Thickness and Guarantee Period. From paper before American Society for Municipal Improvements. By J. W. Howard, 1½ pp., Good Roads, January. 10 cts.

Brick Paving, The future of. 2 pp., Brick, January. 10 cts.

Concrete Pavement Construction at Boise, Ida. ½ p., Engineering-Contracting, Jan. 19. 10 cts.

Concrete Pavements. Communication from S. Whinery. 1/3 p., Engineering News, Jan. 6. 15 cts.

Concrete Road Construction in Wayne County, Mich.; with some data on cost. Illustrated, ½ p., Engineering-Contracting, Jan. 26. 10 cts.

Possibilities of Portland Cement as a Road Material. Paper before Association of American Portland Cement Manufacturers. By L. W. Page, 1 p., Engineering-Contracting, Jan. 5. 10 cts. 1 p., Contractor, Jan. 15. 20 cts. 3 pp., Cement Age, January. 15 cts.

Concrete Paving at Memphis. In use for nine years. First laid along car track and on bridges. Proportions of mixture and method of laying. Pavement in good condition after seven years. By J. H. Weatherford, City Engineer. Illustrated, 2½ pp., Municipal Journal and Engineer, Jan. 5. 10 cts.

Economics of Street Paving. From report to the Boston Finance Commission. By Samuel Whinery, 1 2/3 pp., Engineering-Contracting, Jan. 12. 10 cts.

System for Recording and Accounting for Supplies and Labor in the Paving Division of a City Street Department. From report to Boston Finance Commission. By Samuel Whinery. Illustrated, 3pp., Engineering-Contracting, Dec. 29. 10 cts.

Curbs and Gutters, Concrete. Methods of Laying. Illustrated, 1½ pp., Cement World, January. 15 cts.

Gutter Culverts. Box culverts at Chattanooga. Details of casting and construction. Use of vitrified clap pipe, Cast-iron water pipe. Brick arch culvert. Plain street intersections. Illustrated, 3 pp., Municipal Journal and Engineer, Jan. 5. 10 cts.

Pipe Culverts of Corrugated Iron. Illustrated, 1 p., Engineering News, Jan. 20. 15 cts.

Draining Street Intersections. Communication from J. H. Weatherford. 1-3 p., Municipal Journal and Engineer, Jan. 26. 10 cts.

Street Crossings and Driveways. Private driveways across sidewalks. Alley crossings. Good standard construction in two cities. Street crossings of various kinds. Illustrated, 2 pp., Municipal Journal and Engineer, Jan. 12. 10 cts.

Manhole Head, An objectionable. The mushroom type. Illustrated, ½ p., Municipal Journal and Engineer, Jan. 5. 10 cts.

Street Signs and Corner Obstructions. 1/3 p., Municipal Journal and Engineer, Jan. 5. 10 cts.

Roadless Streets in Venice, Cal., 1-3 p., Municipal Journal and Engineer, Jan. 19. 10 cts.

Retaining Wall Construction in Connection with Chicago Track Elevation Work. Illustrated, 1½ pp., Engineering-Contracting, Dec. 29. 10 cts.

Large Concrete Retaining Wall. More than 50 feet high. Divides street into two levels. Expansion and construction joints. Methods .of .construction. . Contractor's plant. By Edw. P. Bailey. Illustrated, 1 p., Municipal Journal and Engineer, Jan. 19. 10 cts.

Highway Tunnel, Driving a Long Missionary Ridge, Chattanooga, Tenn. Illustrated. 1½ pp., Contractor, Jan. 15, 20 cts.

Street Work in Denver. Illustrated, ½ p., Municipal Journal and Engineer, Jan. 19. 10 cts.

Right to Open Streets, Decision on. Opinion by John Proctor Clark of the New York Supreme Court. 1½ pp., Progressive Age, Jan. 15. 20 cts.

SEWERAGE AND SANITATION

Sewer System for Birmingham, Storm. Illustrated, 1½ pp., Contractor, Jan. 1. 20 cts.

A Comprehensive Sewer System of Kansas City, Mo. By J. B. Balcomb. Illustrated, 1½ pp., Engineering News, Jan. 27. 15 cts.

High Level Intercepting Sewer, Toronto. By A. C. D. Blanchard. Illustrated, 3 pp., Contract Record, Dec. 15.

Toronto Main Drainage Works. Construction of High Level Intercepting Sewer. Illustrated, 2 pp., Surveyor, Jan. 7. 20 cts.

Specifications for Concrete Sewers at Richmond, Ind. 2/3 p., Engineering-Contracting, Dec. 29. 10 cts.

A Discussion of Sewer Specification. Suggestions Submitted to Committee of Engineers Appointed by the Board of Estimate, New York City, by the General Contractors Association. 1 p., Engineering Record, Jan. 1. 10 cts.

Constructing Concrete Sewers at Richmond, Ind. By Fred R. Charles. Illustrated, 2 pp., Engineering-Contracting, Dec. 29. 10 cts.

Methods and Cost of Concrete Sewer Work. By Fred R. Charles, City Engineer, Richmond, Ind. Illustrated, 2½ pp., Contract Record, Jan. 19. 10 cts.

Cost of Sewer Construction by Day Labor in Boston. 1/3 p., Engineering Record, Jan. 1. 10 cts.

Day Labor and Contracts on Sewer Extension Work. Report by Metcalf and Eddy to Boston Finance Commission. ½ p., Engineering Record, Jan. 22. 10 cts.

Capacity of Tile Drains, Formulas for the. From paper before American Society of Agricultural Engineers. By Prof. E. A. Hamilton. ½ p., Engineering-Contracting, Jan. 12. 10 cts.

Sewage Disposal on Modern Principles in a Small Urban District. Novel method of air compression. Sewage Works at Brumby and Frodingham, England. Illustrated, 1 1/3 p., Municipal Journal, Jan. 14. 15 cts.

Sewage Disposal Works at the Danville, Pa., State Hospital. Illustrated, 1 1-3 pp., Engineering Record, Jan. 15. 10 cts.

Ocean Grove Sewage Disposal Plant. By Clyde Potts. Illustrated, 1 1-3 pp., Engineering Record, Jan. 8. 10 cts.

New Sewage Disposal Works, Sheffield, England. 1 2/3 pp., Engineering Record, Jan. 1. 10 cts.

Tank Treatment of Sewage. Classification of tanks. Advantages of different kinds. Septic and nonseptic conditions. Hydrolytic tank. Slate bed. Continuous and quiescent flow. Vertical tanks. 1½ pp., Municipal Journal and Engineer, Jan. 5. 10 cts.

Modern Septic Tanks. Paper before League of California Municipalities. By G. L. Hoxie. 4 pp., Pacific Municipalities, December. 10 cts.

A Simple Septic Tank of Concrete for a Dwelling House. Illustrated, 1 p., Cement World, January. 15 cts.

Septic Tank in California. Action of cities to resist collection of royalties by the Cameron Company. ¼ p., Municipal Journal and Engineer, Jan. 26. 10 cts.

Sludge Disposal, Problem of. Abstract of paper before Institute of Municipal Engineers. By W. C. Easdale. 1/3 p., Local Government Journal, Jan. 15. 10 cts.

A Centrifugal Sewage Sludge Drier. Illustrated, 1 1/3 pp., Engineering News, Jan. 13. 15 cts.

Separation of Solids from Sewage and Waste Liquors. Paper before Association of Municipal and County Engineers. By James P. Norrington. Illustrated, 1½ pp., Engineering Record, Jan. 1. 10 cts. 1 p., Engineering News, Dec. 30. 15 cts.

Disinfection of Water and Sewage Filter Effluents. From paper before Boston Society of Civil Engineers. By E. B. Phelps. 1 1/3 pp., Engineering Record, Jan. 15. 10 cts.

Standards of Purification for Sewage Effluents. By John T. Thompson, 8 pp., Journal Royal Institute of Public Health, January. 50 cts.

Standards for Sewage Effluents. From paper before Association of Managers of Sewage Disposal Works. By J. C. Thresh. 1 1/3 pp., Engineering-Contracting, January 5. 10 cts.

Sanitary Institute, Work of the Royal, in the Training and Examination of Sanitary Officers and the Advancement of the Public Health. Illustrated, 2 pp., Municipal Journal, Jan. 7. 15 cts.

Importance of Teaching the Subject of Health in the Public Schools. 8 pp., North Carolina Board of Health, November. 10 cts.

Control of Diphtheria in Schools. By Thos. Orr. 8 pp., Journal Royal Institute of Public Health, January. 50 cts.

Prevention of Malaria. By Prof. Ronald Ross, University of Liverpool. 3 pp. Public Health Reports, Jan. 21. 10 cts.

Evidence of Plague Infection among Ground Squirrels. By G. W. McCoy. 7 pp., Public Health Reports, Jan. 14. 10 cts.

WATER SUPPLY

Water Supply System of Cheyenne, Wyo. Illustrated, 2½ pp., Engineering Record, Jan. 22. 10 cts.

The World's Biggest Water Project. The Catskill Water Supply. 90 miles of aqueduct and tunnel. World's records for speed

in laying masonry and tunnel. Mountain tunnel 250 feet below sea level. 600 feet feet below Broadway. Illustrated, 7½ pp., Municipal Journal and Engineer, Jan. 19. 10 cts.

New York City Water Supply. By W. W. Brush. Paper before New England Water Works Association. Illustrated, 28 pp., Journal, New England Water Works Association, December. $1.00.

Notable Water Supply Projects. Illustrated, ½ p., Municipal Journal and Engineer, Jan. 19. 10 cts.

Chicago Water Works System. Illustrated, 2 pp., Fire and Water, Jan. 19. 10 cts.

San Francisco's Water Supply. By Herman Schussler. 2 pp., Water and Gas Review, January. 20 cts.

Montreal's Water Supply. Comment on paper by George Janin. ½ p., Canadian Engineer, Jan. 14. 15 cts.

Water Supply Problem of Montreal. By George Janin. Illustrated, 3½ pp., Canadian Engineer, Jan. 14. 15 cts.

Poughkeepsie Water Works. Amount of purification secured by sedimentation. Disinfecting with chlorine. Result from sand filters. Department record. 1 p., Municipal Journal and Engineer, Jan. 26. 10 cts.

Little River Water Works Completed. Illustrated, 1 p., Fire and Water, Jan. 5. 10 cts.

Water Improvements at Altoona. Illustrated, 2 pp., Fire and Water, Jan. 12. 10 cts.

St. Marys Water and Light Plant. Illustrated, 1 p., Municipal Journal and Engineer, Jan. 5. 10 cts.

Streams and Water Courses. Duties and Liabilities of local authorities. Paper before Croyden District Surveyors' Association. By C. H. Cooper, 1 p., Surveyor, Dec. 31. 20 cts.

Conservation of Jersey Waters. 2/3 p., Fire and Water, Jan. 12. 10 cts.

Ground Waters as Sources of Public Water Supply. By W. S. Johnson. From paper before New England Water Works Association. 6 pp., Water and Gas Review, January. 20 cts. 14 pp., Journal New England Water Works Association, December. $1.00.

The Deep Well System of Water Supply for South Bend, Ind. Paper before Indiana Engineering Society. By H. E. Hammond. Illustrated, 1 p., Engineering News, Jan. 27. 15 cts.

Dam at Dansville, N. Y., Failure of a Concrete. Illustrated, 1 1/3 pp., Engineering News, Jan. 13. 15 cts.

Large Blast at Morena Dam, California. By M. M. O'Shaughnessy. Illustrated, 2-3 pp., Engineering News, Dec. 30. 15 cts.

Progress on the Ashokan Reservoir. Illustrated, 1½ pp., Engineering Record, Jan. 22. 10 cts.

Covering of the Distributing Reservoir at Reading. Illustrated, 1 1/3 pp., Engineering Record, Jan. 22. 10 cts.

Aqueduct, Cut and Cover Construction on the Catskill. Illustrated, 3½ pp., Engineering Record, Jan. 8. 10 cts.

Tunnel Progress on the Rondout Pressure. By John P. Hogan, Asst. Engineer, Board of Water Supply, New York. Illustrated, 1½ pp., Engineering Record, Jan. 1. 10 cts.

Inclined Diamond Drill Borings under the Hudson River. Illustrated, 2 pp., Engineering Record, Jan. 15. 10 cts.

Water Pipe, Depth of. Customary depth, and influence of same upon freezing. Data from 87 cities collected by the New England Water Works Association. Circulation prevents freezing. Ice in standpipes. Illustrated, 3 pp., Municipal Journal and Engineer, Jan. 5. 10 cts.

Report of the Committee on the Depth of Water Pipe. 6 pp., Journal, New England Water Works Association. December. $1.00.

Water Purification Works at Canyon City. Illustrated, 2 pp., Engineering Record, Jan. 15. 10 cts.

Automatic Water Purification. Comment on St. Louis plant. ¼ p., Municipal Journal and Engineer, Jan. 5. 10 cts.

Policy of Water Filtration. Paper before New York Association of Private Water Companies. By G. C. Whipple. 1¼ pp., Fire and Water, Jan. 5. 10 cts.

Reservoir and Filtration Costs and Methods. From annual report of Major J. J. Morrow, on conditions at Washington, 1 p., Contract Record, Jan. 12. 20 cts.

Water Supply and Purification. Paper before Union of Saskatchewan Municipalities. By T. A. Murray. 4½ pp., Canadian Municipal Journal, January. 10 cts.

Iron Lime Coagulation at St. Louis. Description of the process and appliances used. Details of automatic arrangement. Illustrated, 4½ pp., Municipal Journal and Engineer, Jan. 5. 10 cts.

Algæ Treatment at Troy. Great Variety of Organisms. Withstand low temperature. Application of copper sulphate. Cost of labor and material. Results obtained. Effect on fish. Paper before New York Association of Private Water Companies. By Prof. James M. Caird. 1 p., Municipal Journal and Engineer, Jan. 19. 10 cts.

Cresote for Destroying Algæ. Communications from Karl F. Kellerman. 1/3 p., Municipal Journal and Engineer, Jan. 19. 10 cts.

Reducing Consumption of Water in Washington, D. C., Results Achieved in. 1 p., Engineering-Contracting, Jan. 26. 10 cts.

Domestic Water Supply by Meter. 1 p., Canadian Engineer, Dec. 31. 15 cts.

Typhoid in Washington, Causes of. 1/3 p., Municipal Journal and Engineer, Jan. 12. 10 cts.

Appraisement of Water Works. Plan adopted at Delaware, O. ¼ p., Municipal Journal and Engineer, Jan. 19. 10 cts.

STREET LIGHTING AND ELECTRIC POWER

Street Lighting in the City of New York. By H. T. Owen. Illustrated, 3½ pp., Electrical Review, Jan. 1. 10 cts.

Street Lighting in the Business District of St. Louis. Illustrated, 2/3 p., Engineering News, Jan. 6. 15 cts.

Street Lighting Rates in Cities of New York State. ¼ p., Municipal Journal and Engineer, Jan. 5. 10 cts.

Income from Street Lighting. 1 p., Electrical Review, Jan. 8. 10 cts.

Street Lamps, Comparison of. Tests in Washington, D. C., of enclosed and magnetite arc, Tungsten mantle gas and naphtha lamps. Cost per foot of street. Illustrated, 1½ pp., Municipal Journal and Engineer, Jan. 19. 10 cts.

Tungsten Street Lamps. ½ p., Municipal and Engineer, Jan. 12. 10 cts.

Municipal Lighting Plant, Thomasville. Illustrated, ½ p., Municipal Journal and Engineer, Jan. 12. 10 cts.

8. 10 cts.

Municipal Gas and Electricity at Holyoke 1/3 p., Municipal Journal and Engineer, Jan. 19. 10 cts.

Why Gilroy Ceased to Operate Its Municipal Gas Plant. By W. G. Fitzgerald. 4 pp., Pacific Municipalities, December. 10 cts.

Annual Report of the Chicago Electrical Department. 1 p., Electrical Review, Jan. 8. 10 cts.

Electrical Conduits, Construction of. Description of four parallel lines in Boston. Fiber conduits in Auburn, N. Y. Novel manhole construction. Details of collapsible manhole forms. Illustrated, 5 pp., Municipal Journal and Engineer, Jan. 26. 10 cts.

Comparative Methods and Costs of Underground Conduit Construction. By Clarence Mayer. Illustrated, 3 pp., Engineering-Contracting, Jan. 5. 10 cts.

Electrolysis, Damages by. What European cities do to prevent losses. Use of rail for return circuit. Connecting rails to pipes. Permissible drop in potential. 1 p., Municipal Journal and Engineer, Jan. 5. 10 cts.

Central Stations for Towns of 1,000 to 1,200 inhabitants. By C. D. Haskins. 2 pp., Electrical Review, Jan. 8; 3 pp., Jan. 15. 10 cts.

A 2,000 Horsepower Single Cylinder Gas Engine. Illustrated, 2 pp. Power, Jan. 25, 5 cts.

Southern Hydro-electric Power Development. By W. H. Harris. Illustrated, 2 pp., Manufacturers' Record, January 6. 25 cts.

GOVERNMENT AND FINANCE

Commission Government. Provisions of Colorado Springs. Graphic illustrations of the organization of officers and employees. 1 p., Municipal Journal and Engineer, Jan. 26. 10 cts.

Commission Government in Kansas. 1/3 p., Municipal Journal and Engineer, Jan. 5. 10 cts.

How Will the Commission Form of City Government Affect Engineers and Contractors? 1 p., Engineering-Contracting, Jan. 19. 10 cts.

Batlimore's Revised Charter. ½ p., Municipal Journal and Engineer, Jan. 26. 10 cts.

Short Ballot Principle, The. ½ p., Municipal Journal and Engineer, Jan. 26. 10 cts.

A Short Ballot. Address by Chas. W. Eliot before National Civil Service Reform League. 5 pp., Good Government, January. 10 cts.

City Accounting, Standardizing. Reports upon proposed system for St. Louis. 1/3 p., Municipal Journal and Engineer, Jan. 12. 10 cts.

State Administrative Supervision over Local Accounting. By Roy Smith. 7 pp., Journal of Accountancy, January. 25 cts.

Depreciation. Renewal and Replacement Accounts. Paper before American Association of Public Accountants. By H. G. Stockwell. 21 pp., Journal of Accountancy, January. 25 cts.

Debentures, Municipal Situation regarding the Sale of. 1 p., Municipal World, January. 10 cts.

Assessment, Municipal. Report to Union of Nova Scotia Municipalities. By Mayor Stuart Bridgewater. 2 pp., Canadian Municipal Journal, January. 10 cts.

Official Valuations of Private Property. Paper before American Economic Association. By F. W. Whitridge. 2½ pp., Electric Railway Journal, Jan. 15. 10 cts.

Budget Making, Statistical Basis of. Paper before American Statistical Association. By Herman A. Metz. 10 pp., Journal of Accountancy, January. 25 cts.

Public Service Corporations, Valuation of. Paper before American Political Science Association. By W. H. Williams, 2 pp., Electric Railway Journal, Jan. 8. 10 cts.

Overhead Charges in Utility Valuation. 2 pp., Public Service, January. 20 cts.

Work of the New York Public Service Commission. 1½ pp., Engineering News, Jan. 27. 15 cts.

The Signs of the Times regarding Public Service Franchises. By T. N. McCarter. 2 pp., Public Service, January. 20 cts.

How Municipalities Should Deal with Corporations. By T. A. Hunt, City Solicitor, Winnipeg. 4 pp., Western Municipal News, January. 10 cts.

Time Sheets for City Employees. System recently adopted in New York. ½ p., Municipal Journal and Engineer, Jan. 12. 10 cts.

Inspection, Millions Saved by. New York's Division of Inspection. Over a thousand excessive charges a year. One-half million saved in coal alone. Crooked ways for favoring contractors. Standardizing specifications. Illustrated, 4½ pp., Municipal Journal and Engineer, Jan. 12. 10 cts.

Low Rates in Municipal Plants. The Cumberland, Wis., case before Utilities Commission. 2 pp., Public Service, January. 20 cts.

TRAFFIC AND TRANSPORTATION

Street Traffic, Regulation of. New York Rules and Ordinance. Similar regulations adopted by Lexington and Louisville and proposed for St. Louis. Education of drivers most important. Ilustrated, 2 pp., Municipal Journal and Engineer, Jan. 5. 10 cts.

Street Car Stops, Cities' Power Over. 1/3 p., Municipal Journal and Engineer, Jan. 5. 10 cts.

Low Fare Ordinance Nullified, Minneapolis. 1 p., Electric Railway Journal, Jan. 22. 10 cts.

United States Supreme Court Decision Nullifying Minneapolis Low Fare Ordinance. 2 pp., Electric Railway Journal, Jan. 15. 10 cts.

Public Service Commission, First District Annual Report of New York. 1½ pp., Electric Railway Journal, Jan. 15. 10 cts.

Annual Report of Second District, Public Service Commission, New York. 1½ pp., Electric Railway Journal, Jan. 22. 10 cts.

Massachusetts Commission's Report on Electric Transportation Matters of Boston. 1 p., Electric Railway Journal, Jan. 22. 10 cts.

Chicago Traction Discussed by Western Society of Engineers. 1 p., Electric Railway Journal, Jan. 22. 10 cts.

Track Elevation, Evanston. By E. O. Greifenhagen. Illustrated, 2 pp., Engineering Record, Jan. 22. 10 cts.

Subway, Main Street, Cambridge, Mass. Illustrated, 1 1/3 pp., Engineering Record, Jan. 1. 10 cts.

Gyroscopic Car in Brooklyn. Illustrated, 1 p., Electric Railway Journal, Jan. 15. 10 cts.

New Gyroscopic Monorail Car. Illustrated, 2/3 p., Engineering News, Jan. 27. 15 cts.

Traction Engines, Suggestions on the Design and Selection of. Paper before American Society of Agricultural Engineers. By W. F. MacGregor, 1 2/3 pp., Engineering-Contracting, Jan. 12. 10 cts. 1 p., Engineering News, Jan. 27. 15 cts.

STREET CLEANING AND REFUSE DISPOSAL

Collection and Disposal of House Refuse. By J. S. Brody. 1/3 p., Local Government Journal. Jan. 15. 10 cts.

Rules for Garbage and Ash Collection. ¼ p., Municipal Journal and Engineer, Jan. 26. 10 cts.

Municipal Waste. Its collection and disposal. Paper before Australian Health Society. By Wm. Calder. Illustrated, 3 pp., Surveyor, Jan. 7. 20 cts.

Disposal of Dairy Wastes. From Bulletin of the Ohio State Board of Health. By A. Elliott Kimberly. 1 1/3 pp., Engineering Record, Jan. 8. 10 cts.

Design and Operation of Refuse Destructor. From paper before Association of Municipal and County Engineers. By

W. F. Loveday. 1 1/3 pp., Engineering Record, Jan. 8. 10 cts.

New Refuse Destructor at Milwaukee, Wis. ½ p., Engineering Record, Jan. 1. 10 cts.

Disposal of Manufactured Wastes and Sewage at Gloversville. From report by H. P. Eddy and Morrell Vrooman to City Council, Gloversville, N. Y. Illustrated, 2½ pp., Engineering Record, Jan. 22. 10 cts.

Refuse Disposal and a New Refuse Incineration Plant for Milwaukee. Illustrated, 2½ pp., Engineering-Contracting, Jan. 12. 10 cts.

CITY PLANNING AND BEAUTY

Town Planning in Practice. Paper before National Town Planning Congress. By J. H. Barlow. 1 p., Contract Journal, Jan. 12. 20 cts.

Town Planning Systems. Abstract of paper before Surveyors' Institution. By W. R. Davidge. 1/3 p., Local Government Journal, Jan. 15. 10 cts.

Town Planning. From paper before conference on town planning. By W. R. Davidge. 1½ pp., Surveyor, Dec. 31. 20 cts.

Practical Town Planning. By Thomas Adams. 1 p., Municipal Journal, Dec. 31. 15 cts.

Housing and Town Planning Congress. 2 pp., Municipal Journal, Jan. 7. 15 cts.

Housing and Town Planning. Paper before National Town Planning Congress. By T. C. Horsfall. 2½ pp., Contract Journal, Dec. 29. 20 cts.

Architecture and Town Planning. Paper before National Town Planning Congress. By Raymond Unwin. 1 1/3 pp., Contract Journal, Dec. 29. 20 cts.

Plan of Cincinnati. By Geo. E. Kesler. Illustrated, 5 pp., American City, January. 10 cts.

Park Improvement, Municipal. Plans for Barrie, Ont. 3 pp., Canadian Engineer, Dec. 31. 15 cts.

Island Park at Otsego, Mich. ¼ p., Municipal Journal and Engineer, Jan. 19. 10 cts.

Smoke Abatement in Cincinnati. By Mathew Nelson. Paper before American Civic Association. 3 pp., American City, January. 10 cts.

Bill Board Regulation, Cincinnati's New. From paper before American Civic Association. By J. W. Peck. 3 pp., American City, January. 10 cts.

MATERIALS OF CONSTRUCTION

Cement, Further Light on the Size of One Cubic Foot of. 1 p., Engineering-Contracting, Jan. 5. 10 cts.

Lack of Uniformity in Results of Cement Tests. Communication from L. A. Waterbury. 1/3 p., Engineering News, Dec. 30. 15 cts.

Concrete Shell Casings for Protecting Wooden Piles against the Teredo. 1 p., Engineering-News, Jan. 13. 15 cts.

Use of Concrete Piles, Reducing Costs and Effecting Better Construction. By W. F. Hall. Illustrated, 22 p., Journal Franklin Institute, January. 50 cents.

Economical Selection and Proportion of Aggregate for Portland Cement Concrete. By Albert Moyer, 3½ pp., Engineering-Contracting, Jan. 19. 10 cts.

Pressure of Concrete on Forms. From paper by Major Francis R. Shunk in "Professional Memoirs" of the Engineering Bureau, U. S. A., 1 p., Engineering Record, Jan. 15. 10 cts.

Reducing Contraction and Absorption of Concrete by Mixing it with Mineral Oil. By Albert Moyer. 1 1/3 pp. Engineering-Contracting, Jan. 12. 10 cts.

Possible Use of Mineral Oils mixed with Concrete. Paper before Association of American Portland Cement Manufacturers. By Albert Moyer. 1 1/3 pp., Engineering Record, Jan. 1. 10 cts.

Disintegration of Concrete by Alkali. Abstract of paper before American Society of Civil Engineers. By G. G. Anderson, 2½ pp., Engineering-Contracting, Jan. 5. 10 cts.

Reinforced Concrete Beams, Continuity in. Communications from R. E. Spalding, S. E. Thompson and R. E. W. Hegarty. 3 pp., Engineering News, Jan. 13. 15 cts.

Ferro Concrete Construction. Paper before Association of Water Engineers. By Harry W. Taylor. 2 pp., Surveyor, Dec. 31. 20 cts.

Economy of Plain and Reinforced Concrete Columns. By Chas. W. Hall. Illustrated, 1½ pp., Engineering Record, Jan. 8. 10 cts.

Tests to Determine the Efficiency of Various Commercial Waterproofing Compounds for Concrete. Illustrated, 3 pp., Engineering-Contracting, Jan. 5. 10 cts.

Iron Metallurgy, A New Process in. Slow rusting iron produced in the open hearth furnace. 3 pp., Engineering News, Jan. 6. 15 cts.

Reducing the Rust Loss. 2/3 p., Engineering News, Jan. 6. 15 cts.

Timber, Processes for the Preservative Treatment of, and Approximate Costs of Treatment. By G. H. Shipley. 1 1/3 pp., Engineering-Contracting, Jan. 19. 10 cts.

BRIDGES

Mushroom System as Applied to Bridges. By C. A. P. Turner. Illustrated, 6 pp., Cement Age, January. 15 cts.

Construction of Rocky River Bridge, Cleveland, O. Illustrated, 4 pp., Engineering Record, Jan. 1. 10 cts.

Steel Work, Rapid Deterioration of, from the Corrosive Action of Locomotive Gas. McCallie Avenue Bridge, Chattanooga, Tenn. 2/3 p., Engineering News, Jan. 20. 15 cts.

Examine Steel Overhead Bridges, Comment on report of Robt. Hooke, City Engineer of Chattanooga. 1/3 p., Municipal Journal and Engineer, Jan. 12. 10 cts.

Steel and Reinforced Concrete Bridge Superstructure for the Bay Ridge Improvement for the Long Island Railroad. Illustrated, 16 pp., Cornell Civil Engineer, January. 20 cts.

Concrete Viaduct, Mulberry Street Reinforced, Harrisburg, Pa. Illustrated, 5 pp., Engineering News, Jan. 13. 15 cts.

Middle Road Bridge at Etobicoke River. The first concrete truss bridge in Canada. Illustrated, 1 p., Municipal World, January. 10 cts.

MISCELLANEOUS

Handling Men on Construction Work, Some Notes on. 2 pp., Engineering-Contracting, Jan. 26. 10 cts.

How Can Men be Advantageously Handled? Discussion of paper by H. P. Gillette before American Society of Engineering Contractors. 3 pp., Contractor, Jan. 15. 20 cts.

Municipal Work, Relative Cost of. Done by Day Labor and Contract. Paper before American Association for the Advancement of Science. By H. P. Eddy, 5 pp., Engineering-Contracting, Jan. 26. 10 cts. 3 pp., Engineering News, Jan. 27. 15 cts.

Boston's Million Dollar Experience in the Municipal Operation of Stone Crushing Plant. 1 p., Engineering-Contracting, Dec. 29. 10 cts.

How Holidays and Sick Leave Inflate the Cost of Municipal Labor. From the Boston reports of Metcalf and Eddy. 1 p., Canadian Engineer, Jan. 14. 15 cts.

Percentage Bidding as Viewed by the Contractor and Engineer. 2/3 p., Engineering Contracting, Jan. 12. 10 cts.

Contracts and Specifications, Suggestions for the Standardization of, in New York City. 1 p., Engineering News, Dec. 30. 15 cts.

Engineering Contracting, Study of, in Engineering Colleges. Paper before American Society of Engineering Contractors. By W. R. Harris. 1 p., Engineering-Contracting, Jan. 12. 10 cts.

Ottawa Civic Works. By N. J. Kerr. Illustrated, 3 pp., Canadian Engineer, Jan. 21. 15 cts.

Municipal Reports, Prompt. Carlisle, Pa., holds the record for 1909. ¼ p., Municipal Journal and Engineer, Jan. 19. 10 cts.

Engineering Files and Indexes, Requirements of. By H. K. Higgins. Paper before Boston Society of Civil Engineers. 2 pp., Engineering News, Dec. 30. 15 cts.

Methods of Filing Books, Pamphlets, Trade Catalogues and Periodicals. 1 p., Engineering-Contracting, Jan. 19. 10 cts.

Foresight Means Better Results. Plea for early action on the part of councils and city officials regarding the season's work. 1/3 p., Municipal Journal and Engineer. Jan. 12. 10 cts.

Monuments, Concrete Boundary. Description for a form proposed by Leonard Metcalf. Illustrated, ½ p., Municipal Journal and Engineer, Jan. 12. 10 cts.

Rock Drill, A Novel Locomotive, and a Remarkable Drilling Record. From paper by Frank Richards in "Compressed Air" for January. 2/3 p., Engineering-Contracting, Jan. 26. 10 cts.

Explosives Ordinance for the City of Chicago, New. 1 2/3 pp., Engineering News, Jan. 13. 15 cts.

The Storage and Handling of Explosives. Abstract of Bulletin 423 U. S. Geological Survey. By Chas. E. Monroe and Clarence Hall. Illustrated, 5½ pp., Engineering-Contracting, Jan. 5. 10 cts.

Ordinance Regulating the Use of High Explosives in Chicago. 1 p., Engineering-Contracting, Dec. 29. 10 cts.

Gravel Washing Plants. Illustrated, 1½ pp., Engineering Record. Jan. 15. 10 cts.

Coal Handling by Automobile Truck. Record of performance and cost. 1/3 p., Engineering News, Jan. 13. 15 cts.

Chimneys, Tapering Concrete. Illustrated, 2 pp., Engineering News, Jan. 13. 15 cts.

Flood Controlling Works, Paxton Creek. Illustrated, 1 1/3 pp., Engineering Record, Jan. 1. 10 cts.

Compressed Air, French Government Regulations for Work under. ½ p., Engineering News, Dec. 30. 15 cts.

Damage Claims, Modern View. 2 pp., Public Service, January. 20 cts.

Fire Apparatus, Austro-German. Illustrated, 1 p., Fireman Herald, Jan. 15. 5 cts.

Two Important Fire Ordinances at Murphreysboro, Ill. 1 p., Fire and Water Engineering, Dec. 29. 10 cts.

Gymnasium, How to Start a Municipal. By E. B. Nero. Illustrated, 6 pp., American City, January. 10 cts.

Baths at Colne, New. Illustrated, 2½ pp., Surveyor, Dec. 31. 20 cts.

Social Centers, Rochester's. By Edw. J. Ward. Proceedings of Playground Association, January. 10 pp. 15 cts.

Bakeries, City. By Carroll Aronovici. Illustrated, 4 pp., Survey, Jan. 8. 10 cts.

Telephone, Is the, a National Monopoly? By Francis Dagger. 2 pp., Canadian Municipal Journal, January. 10 cts.

Rural District, Record of Twenty-Five Years' Experience in a. Paper before Institution of Municipal Engineers. By Wm. Whitehouse. Illustrated, 2½ pp., Contract Journal, Jan. 12. 20 cts. Illustrated, 4 pp., Surveyor, Jan. 7; 3 pp., Jan. 14. 20 cts.

Government Reform. "The Beast and the Jungle." Proofs that Colorado State Supreme Judges are tools of corporations and conscienceless law breakers. By Judge Ben B. Lindsey. Illustrated, 14 pp., Everybody's, February. 15 cts.

BOOK REVIEWS

Street Traffic Regulation. By Wm. Phelps Eno. New York, The Rider and Driver Publishing Company. Cloth, 9x11, 63 pages. Price, $2.

This book consists largely of reports of pamphlets and of articles published during the past ten years by Mr. Eno in his effort to obtain in New York City a special squad and proper ordinances for regulating the city's street traffic. In the introduction Mr. Eno presents a history of his efforts, which have so far materialized in the police rules, the police traffic squad and the ordinance of the Board of Aldermen prescribing rules of the road. The police rules, ordinance and legal references covering the several items of the rules are given in full. In addition, one chapter treats of signs for assisting traffic; others treat of methods to be followed, forms used, etc., in the operations of a Bureau of Street Traffic. Other subjects treated of are cab stands, isles of safety, rules for the management of vehicles at large gatherings and in locations especially congested owing to the convergence or intersection of streets. He also discusses the subject of lay-out of curbs and car tracks, street widths required, speed and other details of street car operation, etc. Part III deals with automobile licenses, numbers, speed, and signs and regulations made desirable by the growth of automobile traffic. Part IV consists of extracts from a pamphlet published in 1907 discussing how to improve city car service. While some may question Mr. Eno's recommendations in connection with street car traffic, we believe there are none who will not admit that he is an authority upon street traffic generally or fail to give him great credit for his persistent efforts to bring some order out of the chaotic conditions which formerly existed on New York's busiest streets. To any city officials who are confronted with the problem of handling street traffic in their city, or to those citizens who think that there exists in their city a problem of this kind which needs attention and who would make recommendations, we know of no other work which can give the information contained in this book.

Los Angeles, Cal., The City Beautiful. Published by William J. Porter, Los Angeles, 1909. Paper, 9x12.

The book is the report of the Municipal Art Commission for the city made to the Mayor, City Council and Board of Public Works. It contains the suggestions embodied in a report by Charles Mulford Robinson, together with plans and picture illustrations of the subject. Los Angeles has under consideration plans for improvements estimated to cost fifty million dollars. The items include three and a half millions for roads, twenty-four millions for an aqueduct and twenty millions for general improvements. The volume is handsomely printed and illustrated in a manner in keeping with the subject. It is one of a dozen or more similar reports that have been gotten up by civic and architectural societies covering contemplated improvements in their own city and making comparisons with others. Anyone specially interested in this subject should have this among his collection.

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Street Railways—Sanitation, Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we can not guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also corrections of any errors discovered.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREET IMPROVEMENTS				
New York	Buffalo	Feb. 4	Paving portions of 5 streets	F. G. Ward, Comr. Public Works.
Ohio	Troy	Feb. 5	Laying creodone block floor on various bridges	A. E. Sinks, County Auditor.
Florida	Palatka	Feb. 5	Bldg. hard-surfaced road to County line and San Mateo	R. F. Ensey, County Engineer.
Minnesota	St. Paul	Feb. 7, 10 a.m.	Improving five roads; J. H. Armstrong, Co. Surveyor	Edw. G. Krahmer, County Auditor.
Indiana	Kentland	Feb. 7, 2 p.m.	Constructing a macadam road	Elmer R. Bringham, Co. Auditor.
North Carolina	Gibson	Feb. 7	Constructing 2.7 miles sand and clay roads for County	J. C. Mason, Chm. Co. Road Comm.
Michigan	Mt. Pleasant	Feb. 7, 8 p.m.	Grading and paving with brick on concrete, 2 streets	H. H Hunter, City Clerk
Kansas	Cherryvale	Feb. 7, 4 p.m.	Brick paving 4,500 yds. on cinder or gravel; 1-2 mile curb	E. E. Bellamy, City Clerk.
Maryland	Kirksville	Feb. 7	Brick paving, 6,000 sq. yds. on 5-in. concrete base; 4,500 lin. ft concrete curb and gutter	J. C. Carothers, City Clerk.
California	Santa Ana	Feb. 7, 5 p.m.	Asphalt concrete paving, etc., West Fourth street	Ed. Tedford, City Clerk.
Georgia	Atlanta	Feb. 7	Furn. and setting granite and concrete curb, brick, tile and cement sidewalks, sewers, etc., ordered for 1910	R. M. Clayton, City Engineer.
Virginia	Norfolk	Feb. 8, noon	Regulating and repaving with smooth material portions of Granby and Chapel streets	W. T. Brooke, City Engineer.
Indiana	Monticello	Feb. 8, noon	Constructing three stone roads	A. G. Fisher, County Auditor.
New York	Brooklyn	Feb. 9, 11 a.m.	Paving various streets, also delivering refined asphalt, asphalt block, paving brick, binder stone, Portland cement, oil, pitch sand tar, metal and gravel heating trucks, etc	Alfred E. Steers, Boro. President.
Indiana	Lafayette	Feb. 9, 10 a.m.	Bldg. gravel road on line bet. Wabash and Tippecanoe towns'ps.	John P. Foresman, County Auditor.
Wisconsin	Oconowoc	Feb. 11	Brick and creo. wood block paving, Collins and Main streets	B. G. Edgerton, Chm. Bd. Pub. Wks.
Wisconsin	Kenosha	Feb. 11, 2 p.m.	Brick paving, 10,737 sq. yds on concrete; 10,000 lin. ft. stone curb; 6,700 cu. yds. excav.; also asphalt paving	M. J. Scholey, Chm. Street Comm.
Ohio	Cincinnati	Feb. 11, noon	Improving Cook ave., Millcreek twp. Specification 988	Fred. Dreihs, Clk. Co. Comrs.
New Jersey	Toms River	Feb. 14, noon	Resurfacing gravel road, 3.69 miles long; stone, 2.94 miles	Jas. E. Otis, Dir. Freeholders.
New York	Albany	Feb. 14, 1 p.m.	Building large number of State highways	State Highway Commission
Illinois	East St. Louis	Feb. 15	Brick paving and curbing Ill. ave. and La. Blvd	W. J. Crocken, City Engineer.
Kansas	Caney	Feb. 16, 5 p.m.	Brick paving, 13,950 sq. yds. curb, gutter, grading, etc.	R. V. Dodson, City Clerk.
New Yor	Albany	Feb. 16, 1 p.m.	Building large number of State highways	State Highway Commission.
Indiana	Marion	Feb. 17	Grading and macadamizing stone road, 12,292 ft. long	A. T. Street, County Auditor.
New York	Albany	Feb. 18, 1 p.m.	Constructing large number of State highways	State Highway Commission.
Iowa	Burlington	Feb. 21, 4 p.m.	Grad. curb with artificial stone, pave. with mineral rubber asphaltic concrete on 5-in. concrete base, 3 sections of Arch st., 40 ft. wide and Central ave.; begin work May 10	J. F. Winters, City Engineer.
Minnesota	St. Paul	Feb. 21	Improving Birch Lake ave. road	E. G. Krahmer, County Auditor.
Illinois	Moline	March 1, 10 a.m.	Bldg. driveways, planting trees, etc., in Riverside Park	Henry J. Gripp, Chm. Park Comm.
North Carolina	Oxford	March 7	Bldg. 20 miles County road; work to include 3,000 cu. yds. of brick, vit. pipe culverts	R. W. Lassiter, Chm. County Comm.
Alabama	Gordon	March 15	Constructing 51 miles of graded road in Houston County	W. J. Parish, County Comm.
North Carolina	Raleigh	March 30	Paving 25,000 sq. yds. with brick, cement filler, bitulithic and asphalt macadam	Wm. W. Willson, City Clerk.
SEWERAGE				
Utah	Salt Lake City	Feb. 4	Constructing pipe sewers in Exten. Nos. 220, 249, 253, 254	Geo. F. McGonagle, City Engineer.
Georgia	Atlanta	Feb. 7	Furn. vit. sewer pipe, castings, etc., building sewers in 1910	J. Z. Foster, City Clerk.
Texas	Houston	Feb. 7, noon	Bldg. santary sewers in Fourth ward; 5,580 ft., 12-in. pipe; with manholes, flush tanks, etc	H. B. Rice, Mayor.
Kansas	Wellington	Feb. 7	Constructing sanitary sewer in Sewer Dist. No. 5	A. B. Cheaver, City Clerk.
Ohio	Louisville	Feb. 7, noon	Bldg. sewers and sewage disposal plant; F. E. Myers, Canton, Engr	Harry L. Rebrassier, Village Clerk.
Minnesota	Canby	Feb. 8	Bldg. 8,600 ft. 6-in., 8,450 ft. 8-in., 1,200 ft. 10-in. sewer; 1,450 ft. 4-in., 4,075 ft. 6-in., 350 ft. 8-in., 800 ft. 10-in. tile subdrain; 50 manholes; settling tank; 6 or 8 h.p. gasoline engine; 4-in. cent. pump vert. submerged; sewage well and pump house; John Wilson, Engr., Mankato	P. O. Sherman, City Recorder.
Florida	Perry	Feb. 8	Bldg. sanitary sewer system; 3 miles, 8 to 15-in. pipe, etc.	J. C. Calhoun, Secy. Bd. Trustees.
Maryland	Baltimore	Feb. 9, 11 a.m.	Contracts 46, 47, 48, 49 and 9 Sanitary Sewer System, inc. power and pump houses, conduits, circular drains, etc	C. W. Hendrick, Ch. Engr. Sew. Com.
California	Mayfield	Feb. 10	Bldg. $37,000 sewer system; J. F. Byxbie, Jr., Palo Alto, C.E.	W. H. Myrick, Town Clerk.
Missouri	St. Louis	Feb. 11	Bldg. 5 to 11-ft. sewer, 2 1-4 miles long; estimate, $246,120	Board of Public Improvements.
New York	Hudson	Feb. 12	Contact beds for sewage disposal plant	
California	Sacramento	Feb. 14	Additional sewage pumping unit, steam or electrically driven	M. J. Desmond, City Clerk.
New Jersey	Washington	Feb. 14, noon	Bldg. sewer system, 8 to 18-in. pipe; sewage disposal plant, piping, grading, etc.; Clyde Potts, N. Y. City, Engr	Dr. C. B. Smith, Mayor.
Ontario	Toronto	Feb. 15, noon	Sewer outlet, sewage tanks, supply of sludge valves, penstocks, special tile, c. i. pipe, etc.; bids by registered post only	G. R. Geary, Chm. Bd. Control.
Oklahoma	Lawton	Feb. 16, 2 p.m.	Bldg. sanitary sewer system for North Additions	Asst. Sec'y Dept. Int., Wash., D. C.
Nebraska	Hebron	Feb. 18	13,000 ft. 8-in. and 3,060 ft. 15 & 10-in. vit. pipe, 12 flush tanks, 25 manholes; cost, $16,500; C. H. Meeker, Engr., McCook	O. P. Hess, City Clerk.
South Carolina	Charleston	Feb. 19, 11 a.m.	Constructing intercepting drain at Navy yard	Commanding Officer, Navy Yard.
Oklahoma	Ardmore	Feb. 21, noon	Bldg. 2 sewage disposal plants of 600,000 gals. per 24 hrs; sewer extensions, etc	G. H. Bruce, City Clerk.
Texas	El Paso	March 3, noon	Bldg. refuse incinerating and sewage pumping station, force main and sewage disposal works with appurtenances; also for furnaces, pumps and machinery; plans, etc., $10; Hering & Fuller, 170 Broadway, New York City, Cons. Engrs	Percy McGhee, City Clerk.
New York	Syracuse	April 1	Harbor Brook improvement, 3 miles long, including constructing of intercepting sewer	Intercepting Sewer Board.
WATER SUPPLY				
Oklahoma	Ralston	Feb. 7, 8 p.m.	Bldg. water works and electric light plant for city	K. A. Earl & Co., Engrs., Muskogee.
California	Sacramento	Feb. 7	Furnishing 8,400 ft. 6-in. and 2,820 ft. 12-in. pipe	M. J. Desmond, City Clerk.
Michigan	Detroit	Feb. 8	Furn. 4,339 tons 6 to 42-in. c. i. pipe, 100 4-in.; 250, i. 6-in.; 150 8-in.; 100 10-in.; 50 12-in.; and 5 16-in.; water gate valves and 100 6-in. test boxes	Benj. F. Guiney, Sec'y Water Bd.
Michigan	Hancock	Feb. 14, 4 p.m.	Furn. single acting triplex plunger pump, 350 gal. per min., electric motor switchboards, etc., f. o. b. Hancock	A. F. MacDonald, Sec. Bd. Pub. Wks.
Wyoming	Ft. Mackenzie	Feb. 14, 2 p.m.	Lining 1,000,000 gal. reservoir with waterproofing felt & vit.brk.	Constructing Quartermaster.
Washington	Roslyn	Feb. 14	Material, specifications, etc., for gravity water system	Mayor Giovanini and Council.
Texas	Midland	Feb. 15	Constructing $50,000 water works; O'Neil Eng. Co., Dallas	J. H. Haley, Mayor.
Ontario	Toronto	Feb. 15, noon	Furnishing cast-iron pipe, iron castings, special tile, etc.	G. R. Geary, Chm. Bd. Control.
New York	New York	Feb. 15	Contract 41; furn. and install. twenty 5x15-ft. sluice gates, 20 operating mechanisms, eight 66-in. stop disk frames, four 66-in. stop disks, 3 sets drive shafting; new bids	J. Waldo Smith, Ch. Engr. B. W. S.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			WATER SUPPLY—Continued.	
Texas	Dallas	Feb. 16, 3 p.m.	Bldg. foundation for pumping station; bldg. dam 2,100 ft. long, 42 ft. high, 2,111 ft. wide at base and 16 ft. at top, and 450 ft. spillway, etc., at White Rock reservoir site; total cost, $750,000; Wm. Barclay Parsons, N. Y. City, Cons. Engr.	J. B. Winslett, City Secretary.
Michigan	Fort Wayne	Feb. 17	Extension to water mains, etc., at post	D. W. Kilburn, Const. Q.. M.
New York	Poughkeepsie	Feb. 17, 4 p.m.	Furn. 5,000,000 gal. each high and low lift pumping engines, surface condenser, two 125 h.p. tubular boilers	R. T. Shields, Clk. Bd. Pub. Wks.
Iowa	Burlington	Feb. 17, 2 p.m.	Furn. and erecting pumping station building and machinery	Harman Eng. Co., Peoria, Ill.
Kansas	Erie	Feb. 17, 3 p.m.	Bldg. water works, electric light plant and sewers	City Clerk.
Nebraska	Hebron	Feb. 18	Improving water works; cost, $5.500; C. H. Meeker, Eng.	O. P. Hess, City Clerk.
Nebraska	Ft. Robinson	Feb. 19	Bldg. addition to pump house, new boilers, pump, etc.	Capt. M. H. Barnum, Constr. Q. M.
Oklahoma	Ardmore	Feb. 21, noon	Bldg. sedimentation basins and filtration plant, and extending water main at city lake	G. H. Bruce, City Clerk.
Texas	Merkel	Feb. 21	Furn. c. i. pipe: 6,208 ft. 8-in.; 5,036 ft. 6-in.; 760 ft. 4-in.; nine 6-in. and three 4-in. gate valves, 27 fire hydrants; laying pipe; furn. and erect. two 20 h.p. and one 6 h.p. gasoline engine; two 250 gal. per min. and one 70-gal. triplex pumps, 50,000-gal. steel tank with steel tower; 125,000-gal. rein. concrete tank, brick pumping station, together with machinery foundations, etc.; Fountain Shaw Eng. Co., Houston	John D. Gaither, City Secretary.
Colorado	Haswell	Feb. 26, noon	Sinking an artesian well near Haswell	Chas.W.Comstock,State Eng.,Denver
Colorado	Cortez	Feb. 26, noon	Sinking an artesian well near Cortez	Chas.W.Comstock,State Eng.,Denver
			BRIDGES	
Ohio	Cleveland	Feb. 5, 11 a.m.	Bridge work, River road, Rockport twp.; Special Report, 2567.	John F. Goldenbogen, Clk. Co. Com.
Kansas	Topeka	Feb. 7	Bldg. bridge over Shunganunga Creek on Fillmore st.	C. B. Burge, City Clerk.
Mississippi	Greenwood	Feb. 7	Bldg. 2 iron bridges, one over Tallatchile river at Money and over Yazoo river at Shell Bluff	C. W. Crockett, Clk. Bd. Superv.
California	Salinas	Feb. 8, 2 p.m.	Repairs on Cannel; also bldg. small bridge	T. P. Joy, Clk. Bd. Supervisors.
Minnesota	Duluth	Feb. 8	Bldg. 3 steel bridges with concrete abutments, two of 150-ft. span each and a 64-ft. span; also timber and pile bridge 100 ft. long and comb. bridge, 64-ft. span and 32-ft. approach	Odin Holden, County Auditor.
Virginia	Bristol	Feb. 8	Bldg. stone or rein. concrete abutments; also steel truss or iron bridge over Beaver Creek on Front st.; 50-ft. clear span, 26-ft. roadway, 8 and 5-ft. walks on brackets, 16 to 18-ft. gross height, 8 ft. above water; separate bids on sub and super	Jas. W. Mort, Chm. St. Com.
Ohio	Oak Harbor	Feb. 8, noon	Work on Oak Harbor bridge	W. H. Mylander, County Auditor, Port Clinton.
Mississippi	West Point	Feb. 8	Building 800 ft. of trestle in Tibbee Bottom	L. J. Howard, Clk. Co. Comrs.
Missouri	Edina	Feb. 8, 2:30 p.m.	Constructing 3 steel bridges	Ed. M. Randolph, Highway Engr.
New Jersey	Bridgeton	Feb. 9, 8 p.m.	Bldg. 2 concrete bridges over Raceway in City Park	Oscar E. Peck, Chm. Park Comn.
Pennsylvania	Reading	Feb. 10, 10 a.m.	Bldg. rein. concrete bridge over creek, in Curwin twp.	A. L. Rhoads, County Controller.
Florida	Palatka	Feb. 12, 11 a.m.	Bldg. bridge over Etomat Creek at Banana Mills	R. F. Ensey, County Engineer.
Washington	Tacoma	Feb. 14	Bldg. rein. concrete viaduct on 23d st	H. J. McGregor, Comr. Pub. Works.
North Dakota	Grand Forks	Feb. 16, 2 p.m.	Bldg. all wooden bridges in 1910; per lin.ft. for truss and plain.	Hans Anderson, County Auditor.
Ohio	Cleveland	Feb. 16, 11 a.m.	Bridge work per Report 2570 for County	J. F. Goldenbogen, Clk. Co. Comrs.
Iowa	Montezuma	Feb. 23	Bldg. cement bridges and culverts in County during 1910	J. W. Rose, County Auditor.
Pennsylvania	Reading	Feb. 23	Bldg bridge 99 ft. long over Ackley creek	J. H. Moffit, County Controller.
Washington	Vancouver	March 1, 10 a.m.	Bldg. 200 ft. steel span and 2 concrete piers, also 1,100-ft. trestle work over Washougal river	M. B. Kies, County Auditor.
Kansas	Topeka	March 7	Bldg. extension at south end Melan bridge over river	C. B. Burge, City Clerk.
North Carolina	Oxford	March 7	Raising 85-ft. steel span 16 ft. higher and bldg. two 75-ft. steel spans, one on either end of present bridge	James Osborn, County Engineer.
Georgia	Savannah	March 14	Bldg. steel highway bridge, inc. foundations over Herb river	G. Reuben Butler, County Clerk.
			LIGHTING AND POWER	
New Jersey	Longport	Feb. 5, 11:30 a.m.	Constructing complete electric light plant: also for brick and concrete boiler house, engine room and stack	H. A. Stout, Chm. Boro. Com.
New York	New York	Feb. 8, 3 p.m.	Labor and material for electric and gas lighting fixtures in Patholog. dept. and male dormitory, Bellevue Hospital	Bd. Trus., Bellevue and All. Hosp.
Ontario	Toronto	Feb. 8	Bldg. feeder conduit runs and manhole at terminal station	Mayor G. R. Geary, Chm. Bd. Cont.
Ohio	Columbus	Feb. 11	Furn. and install. 2 dir.-con. exciter units of 75 h.p., single horizontal auto. high speed engines and 50 k.w., 125-volt dir.-con. generators; Osborn Eng. Co., Engrs., Orborn Bldg., Cleveland.	Bd. Mgrs. Ohio Penitentiary.,
Michigan	Detroit	Feb. 14	Furn. lead-covered cable and installing steam boilers	F. T. Bowler, Sec'y Pub. Lt. Com.
Manitoba	Winnipeg	Feb. 15, 11 a.m.	Furn. and erect. various portions of equipment for terminal station at Winnipeg, turbine governors and gate valves for gen. station, hydro-elec. development	M. Peterson, Sec'y Bd. Control.
North Carolina	Albemarle	Feb. 15	Installing electric light plant; J. M. Bandy, Engr., Greensboro.	I. B. Miller, Mayor.
Kansas	Erie	Feb. 17, 3 p.m.	Bldg. electric light plant, water works and sewers	Burns & McDonnell, K.C.,Mo., Engrs.
Washington	Tacoma	Feb. 21, 9 a.m.	Bldg. headworks and tunnel for hydro-electric power plant on Nisqually river, inc. concrete diverting dam, intake and settling channel, with screens, gates and concrete-lined tunnel 10,015 ft. long; cost, $657,575; F. C. Kelsey, Chief Engineer	H. J. McGregor, Com'r Pub. Wks.
Nebraska	Lincoln	Feb. 24	Furn. and install. complete, with concrete base, 750 h.p. cross-compound, condensing or non-con. or turbine engine, dir.-con. to 3-phase, 60 cycle generator, etc.; $21,835	R. C. Ozman, City Clerk.
			MISCELLANEOUS	
Pennsylvania	Wilkes-Barre	Feb. 4	Erecting $40,000 city lock-up; Reilly & Schroeder, Archts.	F. H. Gates, City Clerk.
Minnesota	Grand Rapids	Feb. 5	Erecting addition to County jail; also cell work	M. A. Spang, County Auditor.
Washington	Tacoma	Feb. 7, 11 a.m.	Furn. first-class motor and chassis for hook-and-ladder	H. J. McGregor, Com'r Pub. Wks.
New Jersey	Red Bank	Feb. 7, 4:30 p.m.	Erecting 65-ft. bell tower for Boro.; complete by March 21	W. A. Shoemaker, Architect.
North Dakota	Fargo	Feb. 7, 5 p.m.	Comb. police and fire alarm telephone system; 10 police call boxes and switchboard to care for 20 boxes	N. C. Morgan, City Auditor.
Texas	Houston	Feb. 7, noon	Erecting new City Auditorium; F. L. Dormant, Cons. Engr.	H. B. Rice, Mayor.
Nevada	Reno	Feb. 8	Erecting $120,000 County Court House; F. J. De Lanchant, Arch	Board of County Commissioners.
Minnesota	Deer River	Feb. 8	Bldg. village jail; whole or separate on building and cell work.	Geo. Herred, Village Recorder.
New York	New York	Feb. 8, noon	Removal snow and ice from Manhattan, Bronx and Brooklyn.	Wm. H. Edwards, Com'r. St. Clean'g.
Florida	Pensacola	Feb. 9, 8 p.m.	Erecting building for County Court House, jail and offices	Jas. MacGibbon, Clk. Co. Comrs.
Pennsylvania	Edgewood	Feb. 10	Removing garbage from Boro. for next fiscal year	O. B. Craig, Chm. St. Com.
Minnesota	Minneapolis	Feb. 11, 7:30 p.m.	Furn. 10 to 60 voting machines as approved by State Comn.	Henry N. Knott, City Clerk.
Iowa	Des Moines	Feb. 14, 9 a.m.	Bldg. municipal market, Wetherell & Gage, Architects	A. J. Mathis, Mayor.
Wisconsin	Kenosha	Feb. 15, 10 a.m.	Erecting County jail; Jos. Lindl, 312 Main st., Archt.	R. H. Jones, County Clerk.
New York	Albany	Feb. 16, noon	Erie Canal Contracts; No. 49, Sec. 8; No. 75, Secs. 9 and 10	F. C. Stevens, Supt. Pub. Wks.
Massachusetts	Springfield	Feb. 17	Bldg. 5-story fire-proof bldg. for Fire Headquarters; also 2-story substation building; separate bids for plumbing, electrical work, etc.; total, $110,000	Jas. W. Kirkham, Chm. Fire Com.
New York	Albany	Feb. 21, 3 p.m.	Bldg. 1900 lin. ft. concrete pier walls with boat landings on foundation of wooden round piling and sheet piling, concrete platforms and shelters, a lavatory, etc.	Walter Melius, City Engineer.
Indiana	St. Joseph	Feb. 21	Furnishing 50 voting machines; cost $40,000	Board Comrs., St. Joseph Co.
Delaware	Wilmington	Feb. 21	Erecting city office bldg., using old walls of pump station	John A. Kienle, Ch. Engr., Wtr. Bd.
Virginia	Lynchburg	Feb. 28, 2:30 p.m.	Bldg. 25-ton incinerating plant, inc. bldg. for burning garbage, refuse and dead animals	H. L. Shaner, City Engineer.
Manitoba	Winnipeg	Feb. 28	Bldg. 5-wire fence and gates along transmission line	M. Peterson, Sec'y Bd. Control.
Arkansas	Heber	March 2	Erecting County jail; F. W. Gibbs & Co., Little Rock, Arkansas.	W. C. Watkins, Jail Comn.
Texas	El Paso	March 3, noon	Bldg. refuse incinerating and sewage pumping station, etc., separate bids for furnaces, machinery, etc	F. H. Todd, City Engineer.
North Dokata	Ashley	April 4	Furnishing 12 metal culverts of various sizes	John F. George, County Auditor

STREET IMPROVEMENTS

Birmingham, Ala.—City is considering $200,000 expenditure for street paving.—Maury Nicholson, City Engineer.

Mobile, Ala.—Board of Public Works has adopted plans for paving four streets, ordered issuance of $295,000 bonds for eighth paving venture and ordered plans drawn for repairing area now covered with Green River asphalt.

Little Rock, Ark.—E. A. Kingsley, Superintendent of Public Works, has prepared plans for bringing to level street block bounded by West Markham, Cross, Water and Victory sts.

Pine Bluff, Ark.—Jefferson County is considering construction of 20-mile rock macadam road.

Burlingame, Cal.—Council has ordered sidewalks laid on all remaining streets.

Claremont, Cal.—Improvement of Yale and Harvard aves. is being considered.

Escondido, Cal.—Plans and specifications have been adopted for paving of portion of Grand ave. with asphalt on concrete base.

Fairfield, Cal.—Specifications will be prepared by Town Engineer E. N. Eager for macadamizing portion of Texas st.

Nevada City, Cal.—Good Roads Committee will ask Board of Supervisors to call election on $350,000 bonds.

San Leandro, Cal.—Board of Town Trustees will pave with asphalt portions of Hayward and San Leandro aves.

Denver, Col.—Board of Aldermen has passed ordinance for opening and extending S. Broadway.

New Britain, Conn.—City has decided to expend about $50,000 for bitulithic pavement.

New Britain, Conn.—City Engineer F. H. Oldershaw and Board of Public Works will take up plan for permanent pavement for entire center of city and report kind of paving they would recommend to be used and cost of same, Feb. 16; area will require about 40,000 sq. yds.

Washington, D. C.—Bids will be received Feb. 3, 2 p. m., for 800,000 paving blocks.—C. H. Rudolph, President Board of Commissioners.

Apalachicola, Fla.—Council has decided to issue $20,000 bonds for street improvement and beautification.

Tampa, Fla.—County Commissioners have appointed committee to lay out Tampa short line road to St. Petersburg.

Atlanta, Ga.—The Street and Road Committee has been asked to appropriate enough money to grade and pave a block on 4th st., between Juniper and Peachtree sts.

Douglasville, Ga.—Douglas County Commissioners have decided to improve roads and construct bridges.

Macon, Ga.—Grand Jury has recommended $500,000 bond issue for improvements including better roads and bridges.

Boise, Ida.—Ada County will vote on bonds for constructing good roads. R. L. Nourse, city, is interested.

Lewiston, Ida.—Nez Perce County Commissioners are preparing for extensive road improvements during coming spring.

Soldier, Ida.—Commercial Club is urging construction of wagon road to Atlanta; cost $10,000.

Bloomington, Ill.—Bids will be received in spring for 50,000 sq. ft. brick paving, with cement and asphalt filler.—Elmer Folsom, City Engineer.

Chicago, Ill.—President Kolacek, West Park Improvement Board, has recommended improvement in various parks and boulevards of West Park system.

Decatur, Ill.—Paving of Main st. is being considered.

East St. Louis, Ill.—Paving of State st. to Edgemont at cost of $225,000 is being considered.—W. J. Crocken, City Engineer.

Elgin, Ill.—City will lay pavements on following streets: Spring st., $61,000; Walnut ave., $46,000, and S. State st., $22,000.—C. E. Plum, City Engineer.

Freeport, Ill.—Board of Local Improvements has decided to pave Union and two streets and Park ave. with brick.

Moline, Ill.—City will lay about six miles of paving this year, including asphalt on 21st st., $9,455; 11h st., $8,500; 16th st., $26,205, and 14th ave., $16,610; also brick on 19th st., $5,132; 1st st., $5,098, and 15th st., $30,849.—C. G. Anderson, City Civil Engineer.

Pekin, Ill.—The Park Board has ordered extension and improvement of macadam driveways in park.

Peoria, Ill.—Board of Public Improvements has instructed City Engineer to prepare estimates for paving with brick four streets and opening Chambers ave.; South Garfield ave. will be paved.

Peoria, Ill.—Bids will be received in spring for 60,000 sq. yds. asphalt and 25,000 sq. yds. brick paving, with pitch and tar filler.—Clay Belsley, City Engineer.

Springfield, Ill.—Park Board is considering asphalting of 4th st.

Waukegan, Ill.—Board of Local Improvements has passed resolution for paving N. County st.—Al. Rogers, Clerk.

Elkhart, Ind.—Board of Public Works has adopted resolutions for improvement of S. 2d st.

Evansville, Ind.—Plans for extensive system of sidewalk improvements throughout city are being formulated by Board of Public Works.

Fort Wayne, Ind.—Plans will be prepared for paving Division st., opening Force st. and for cement sidewalks on Euclid ave.

South Bend, Ind.—City is considering readvertising for bids for Prairie ave. pavement.—A. J. Hammond, City Engineer.

Leon, Ia.—Paving on Church st. is being considered.

Marion, Ia.—Council has passed resolution to pave 17 streets.

Webster City, Ia.—Council will soon consider number of paving extensions.

Garland, Kan.—Board of County Commissioners is considering extension of road south of 10th st.

Hutchinson, Kan.—Construction of public highway from Newton to Colorado State line, distance 275 miles, is proposed. Mayor F. L. Martin and J. L. Smith, Chairman County Commissioners are interested.

Topeka, Kan.—Mayor Wm. Green will at once hire expert to check up records on paving and curbing W. 6th ave.

Winfield, Kan.—City will pave E. 9th st. with brick; cost $20,000.—J. M. Bradley, City Engineer.

Lexington, Ky.—Council will consider construction of three miles of brick streets; cost $150,000.—P. P. O'Neill, City Engineer.

Lexington, Ky.—Joint Improvement Committee will ask for $68,000 appropriation for street improvements.

Gloucester, Mass.—Bids will be received by Committee on Highways for furnishing 3,000 ft. of edge stones.

Lawrence, Mass.—Council has authorized Mayor to petition the State Legislature for permission to issue bonds for paving improvements as follows: Lawrence st., $35,000; Broadway, $213,236; Jackson st., $24,700; Essex st., $6,000; Lowell, Milton and Haverhill sts., $13,700; Union st., $5,500, and Hampshire st., $18,000.—Arthur D. Marble, City Engineer.

Grand Haven, Mich.—Council has called for bids for the paving of Washington ave.

Jackson, Mich.—Estimates will be prepared by City Engineer A. W. D. Hall for paving with brick Francis, Milwaukee and Liberty sts.

Lake Linden, Mich.—Paving of Calumet st. is being considered.—A. F. Heidekamp, President, Village Board.

Duluth, Minn.—Neil McInnis, Chairman of County Board, has recommended $150,000 expenditure for road work during year.

Eveleth, Minn.—City Engineer Austin will prepare plans for paving six blocks on Grant ave.

St. Paul, Minn.—County Surveyor J. H. Armstrong has estimated cost of following improvements: grading and macadamizing Lexington ave., $13,285; improving Manomin rd., $5,042; graveling Rice st. rd., $9,864; macadamizing and grading Centerville rd., $22,500, and improving New Brighton rd., $2,100; bids will be asked soon.

Independence, Mo.—County Court has ordered estimate of cost of grading road running from Lonejack.

Kansas City, Mo.—Residents of western part of city are preparing to improve streets in that district, which includes about six sq. miles of land.

St. Joseph, Mo.—Board of Public Works will let contracts in April for street paving.—Geo. F. Barnes, Secretary; W. K. Seitz, Assistant City Engineer.

St. Joseph, Mo.—Board of Public Works has ordered repaving of Fourth st.

Hastings, Neb.—Citizens will vote on $50,000 bonds for paving.

Atlantic City, N. J.—Bids will be received at once for paving Virginia ave. with bitulithic; City Engineer Rightmire will prepare plans for paving Vermont and other avenues with bitulithic; 3,000 yds. of macadam and 7,200 yds. of vit. brick will be laid on west side.

Camden, N. J.—City Council's Street Committee has approved plans of City Engineer Farnham and of C. E. Thorne, Assistant Engineer of the Pennsylvania Railroad Co., having for their object removal of grade crossing in Federal st.

Camden, N. J.—Council has ordered paving of York st.—I. V. Bradley, Clerk.

Ocean City, N. J.—Cape May County Board of Chosen Freeholders has instructed Director Sayre and County Engineer Rice to submit to State Road Commissioner Gilkyson plans for first 10 miles of the new road between Cape May Court House and Beesley's Point.

Orange, N. J.—Street Commissioner has approved plans of Essex County Park Commission for improvement of Park ave.

Trenton, N. J.—Council has decided to establish grade on Adeline st. and Taylor alley.—W. B. Salter, City Clerk.

Falconer, N. Y.—Citizens have voted $60,000 bonds to pave three streets during coming summer.

Lestershire, N. Y.—Paving of Main st. is being urged.

Lockport, N. Y.—Plans will be prepared for repaving Market st.

Syracuse, N. Y.—Paving of Park ave. is being considered.

Syracuse, N. Y.—Cost of paving Oxford st. with the different materials included in the general paving specifications has been estimated as follows: Sandstone block, creosoted wood block or Hassam pavement with granite top, stone curb, $10,900; same materials, with cement curb or gutter, $10,200; asphalt sheet, vit. brick or block, bitulithic bituminous macadam or Hassam cement concrete pavement, stone curb, $8,080; same materials with cement curb and gutter, $7,600; macadam, stone curb, $5,580; macadam, with cement curb and gutter, $5,300.

Randleman, N. C.—Randleman Township has voted $50,000 bonds for about 14½ miles of road improvements.

Grand Forks, N. D.—City Engineer will prepare plans and specifications for paving Alpha ave.; Council has approved plans for paving District No. 16.

Grand Forks, N. D.—Council has ordered plans prepared for paving and repaving 29,000 sq. yds. on certain streets.—J. D. Taylor, Mayor.

Alliance, O.—City will pave 53,000 sq. yds. during year with brick.—A. A. Kotte, City Engineer.

Bucyrus, O.—City is considering 25,300 sq. yds. of paving.

Canton, O.—City is considering grading, curbing and flagging with 2½-in. flagstone nine streets and paving five streets with brick.—Phil. H. Weber, City Engineer.

Canton, O.—County Commissioners have adopted outline of plans and specifications for improvement of highway between Massillon and West Brookfield.

Cincinnati, O.—Paving and sewering of Lubke alley is being considered.

Collinwood, O.—Village has decided to issue $3,000 bonds for street intersections.—J. F. Murray, Clerk of Council.

Delaware, O.—Delaware County Commissioners are considering construction of two miles of macadam; plans are being prepared for 4½ miles of macadam paving on Berkshire rd.—W. F. Whittier, County Surveyor.

Elyria, O.—Board of Public Service is considering paving following streets: Furnace st., 5,600 sq. yds.; Chestnut st. and West ave.—Martin Mueller, Director.

Mansfield, O.—Council is considering improvement of four streets.

Massillon, O.—Grading and graveling of Devigh, Edwin and Arthur sts. are being considered.

Sandusky, O.—Council has instructed Board of Control to prepare plans and estimates for paving E. Washington st.

Durant, Okla.—Council has passed resolution to pave 14 blocks in business district.

Lawton, Okla.—Council has instructed City Engineer to prepare plans and specifications for paving cross streets from 3d to 6th st.

Baker City, Ore.—Council has decided to improve Center st.—Wm. Pollman, Mayor.

Marshfield, Ore.—Construction of a wagon road from Coos Bay to Roseberg via Coquille and Myrtle Point is being urged; cost $50,000.

Newport, Ore.—Council has decided to improve Beach st.

Salem, Ore.—Marion County is considering improvement of many roads.

Allentown, Pa.—Council is considering paving of 16th and 3d sts.

Altoona, Pa.—Paving of W. Chestnut ave. is being considered.—Franz Engstrom, City Engineer.

Harrisburg, Pa.—Council is considering $5,000 appropriation to repair sidewalks.

Hazleton, Pa.—Paving of S. Church st. is being considered.

Chattanooga, Tenn.—County Engineer Dodds will soon advertise for bids for grading Rossville Boulevard.

Knoxville, Tenn.—City Engineer Newton has recommended improvement of twelve streets and all unpaved alleys in First Fire District.

Rutledge, Tenn.—Grainger County has voted $100,000 bonds for pikes.

Sherman, Tex.—Sherman Precinct is considering election on $350,000 bonds to build 72 miles of permanent roads.

Wichita Falls, Tex.—Citizens will vote Feb. 18 on $40,000 paving bonds.

Salt Lake City, Utah.—Council has decided to pave Canyon rd.

Norfolk, Va.—Paving of Pearl st., cost $1,739, is being considered.

Richmond, Va.—City Engineer Charles E. Bolling has submitted to Council Committee on Streets estimate of $2,079,691.94, most of which is for street improvements.

Roanoke, Va.—Citizens will vote March 24 on $285,000 bonds for street improvements.

Staunton, Va.—Supervisors of Augusta County have assumed charge of construction of macadam road over Blue Ridge Mountains along Rockfish Gap road as far as county line from Waynesboro, distance two miles; Nelson and Albemarle counties and residents have agreed to construct remainder of ten miles from Waynesboro to Greenwood.

Bellingham, Wash.—County Commissioners are considering election on $500,000 bonds for repairing roads and bridges.

Olympia, Wash.—Thurston County Commissioners will expend $37,100 on improvements of county roads.

Seattle, Wash.—City Engineer R. H. Thomson has estimated cost of street improvements as follows: North and West 78th st., concrete sidewalks, $19,100; East Jefferson st., asphalt paving, $28,500; 20th ave. South, asphalt paving, $55,000; 36th ave., etc., sewers, $39,000; West Garfield st., planking, $48,500; Washington st., concrete walks, $5,200.

Tacoma, Wash.—Pacific Heights Improvement Club will ask Council to grade South 36th, 37th and 38th sts. looking to completion of bridge over gulch at South 37th st.

Tacoma, Wash.—Formation of paving district in vicinity of S. 7th st. is being considered.

Walla Walla, Wash.—South 2d st. residents are urging paving of that thoroughfare.

Beloit, Wis.—Prairie ave. will be paved with vit. brick; city will lay 2½ miles of paving this year.

Burlington, Wis.—Council has ordered paving of two streets with brick on 6-in. concrete base.—P. J. Hurtgen, Chairman Board of Public Works.

Kenosha, Wis.—Bids will be received Feb. 11, 2 p. m., for improvement of Dayton st. and Ashland ave, 10,737 sq. yds. brick pavement, 9,996 lin. ft. stone curbing and 6,700 cu. yds. excavation.—M. J. Scholey, Chairman Street Assessment Commission.

Milwaukee, Wis.—City will improve Greenfield ave.

Racine, Wis.—Paving of 9th st. with macadam is being considered. Council is considering $113,292.55 expenditure for paving, sewers and other work; paving of Kinzie st. with brick is being urged.

Sheboygan, Wis.—Council is considering paving of South Water, South 9th sts. and Wisconsin ave.; also macadamizing of Maryland ave.

Superior, Wis.—Improvement of two streets is being considered.—Alderman A. F. Chadwick, Chairman Committee on Streets.

Wausau, Wis.—Plans and specifications have been prepared for about 22,000 sq. yds. of brick or creosoted wood block paving.—O. A. Wennberg, Assistant City Engineer.

CONTRACTS AWARDED

Los Angeles, Cal.—Improving four miles of roads, to F. F. Prendergast, $30,657.

Santa Barbara, Cal.—Paving Bath st., to Patillo Contracting Co., Los Angeles.

Atlanta, Ga.—Paving Marietta st., to Thornton & Mason, city.

East St. Louis, Ill.—Improving 25th st., to Myers Construction Co., St. Louis, $16,300.95.—Silas Cook, President Board Local Improvements.

Springfield, Ill.—Paving College st., to Richard Egan, $1.48 per sq. yd. for brick pavement and 47c. per ft. for curbing; asphalt filler will be used.

Urbana, Ill.—Paving S. Goodwin ave, to George E. Peter, Sycamore, $6,450.

Anderson, Ind.—Fifteen miles of road, Pipe Creek Township, to Madison Construction Co.

Lake Providence, La.—Sidewalks three miles, to Knight & Samford, Atlanta, Ga.

Ishpeming, Mich.—Road, to Gust Fredin, $4,240.

Vicksburg, Miss.—Paving and storm sewers on Drummond st., to Southern Paving & Construction Co., Chattanooga, Tenn., $19,000.

Newark, N. J.—Resurfacing and repaving asphalt streets for year to Standard Bitulithic Co., $1.23 sq. yd.

Oxford, N. C.—11 miles of county road, to T. W. Chandler & Co., Virgilina, Va.

Cincinnati, O.—Improving Stone Mill rd., to H. E. Steele, $7,370.

Oklahoma City, Okla.—Paving one mile of drives, Fairlawn Cemetery, to California Paving Co., H. M. Johnson, Chandler, President; about $6,000.

Wilkes-Barre, Pa.—Hillside st., Metropolitan brick, to H. G. Mulock & Co., $2.35 for brick and $2.95 Belgian block; redstone curbing, to John E. James, 75c.

Colorado, Tex.—Grading, 15 blocks, to J. M. Terry.

Menasha, Wis.—Furnishing 5,000 bbls. cement to be used in paving of Tayco, Main and Racine sts., to H. H. Plummer, $1.35 per bbl.

BIDS RECEIVED

Pine Bluff, Ark.—Concrete work throughout District No. 3, Capital City Concrete Co., Springfield, Ill., lowest bidder, 9.9c. per sq. ft. on sidewalks and 44c. per lin. ft. on curbing.

New Bedford, Mass.—Supplies for Street Department, Superintendent Lawson, as follows: Sewer pipe, prices being quoted as certain per cent. discount from the standard quotations: Fisk & Co., Boston, 6 to 24 in., 73 per cent.; 27 to 30 in., 65 per cent.; 33 to 46 in., 60 per cent.; M. Denault, Jr., 72 per cent., 64 per cent., 59 per cent.; C. S. Paisler, 74¼ per cent., 66 per cent., 61 per cent.; H. A. Cosgrove, Boston, 73 per cent., 65 per cent., 60 per cent.; S. S. Paine Bros., 71 per cent., 63 per cent., 58 per cent.; D. W. Lewis & Co., 73 per cent., 65 per cent., 60 per cent. The prices are all f. o. b. New Bedford, and the discounts are all for single standard. Some bidders gave quotations on double strength 5 to 6 per cent. less discount.

The bids for Portland cement follow: Moses Denault, Jr., $1.58 f. o. b. New Bedford, $1.57 from storehouse; Paisler & Willis, $1.60, $1.65; S. S. Paine Bros., $1.52, $1.57. Fiske & Co., Boston, $1.60. Denault's and Paisler's bids were on cement in barrels or in bags; Paine's price on Shield cement was $1.10 f. o. b. New Bedford; $1.15 from storehouse; five cents less per barrel for Paragon brand. Fiske & Co. offered Rosindale cement at 70c. in wood or 73c. in cloth.

Bids for brick, Paisler & Willis, $9.15 per 1,000 f. o. b. New Bedford: S. S. Paine Bros., $9 per 1,000 f. o. b. New Bedford.

Bids for sand: J. Connell, Jr., $1 per ton delivered; Dennis J Devlin, $1.10 per ton delivered south of Union st.; Dennis J. Devlin, $1 per ton delivered north of Union st.; D. Goodreau, 88c. per ton delivered; Benjamin Sykes & Co., 84c. delivered.

Detroit, Mich.—Furnishing about 1,000,000 paving bricks during fiscal year, price given per sq. yd.: Detroit Brick Co., 77.9c.; Michigan Brick Co., 77.9c.; Bessemer Lime Stone Co., 83c.; Deekman Duty Brick Co., 81.2c. and 83c.; F. B. Stevens, 83c.; Metropolitan Co., three bids, 82.4c. to 83c., Novelty Brick Co., 82c.

SEWERAGE

Mobile, Ala.—Board of Public Works has decided to lay drain pipe in Michigan ave. ditch.

Phœnix, Ariz.—Citizens will vote on $300,000 bonds for construction of sewer system.

Colton, Cal.—Will L. Brown, San Bernardino, is preparing plans for construction of new sewers; cost $65,000.

Lodi, Cal.—Board of Trustees will at once ask bids for construction of sewer system.

Los Angeles, Cal.—Board of Public Works has recommended construction of storm sewer in Marmion Way; cost $10,297.

Los Gatos, Cal.—City Engineer R. B. Chandler is surveying for sewer on San José ave.

Mayfield, Cal.—Bids will be received about Feb. 10 for the construction of a sewer system; cost $37,000.—J. F. Byxbee, Jr., Palo Alto, Engineer; W. H. Myrick, Town Clerk.

Oakland, Cal.—Board of Public Works has ordered sewers constructed in three streets.—F. R. Thompson, City Clerk.

Oroville, Cal.—Committee of local engineers preparing plans and specifications for sewer system have about completed work.

San Francisco, Cal.—Board of Harbor Commissioners has approved plan submitted by Board of Public Works for construction of sewer between El Dorado and 16th st.

Denver, Col.—Board of Aldermen has decided to establish Arlington Park storm sewer district.

Ansonia, Conn.—Bids will be received in March for 1,250 ft. of outfall sewer.—V. B. Clarke, City Engineer.

Eastman, Ga.—Consulting Engineer Arthur Pew, Atlanta, will prepare plans and supervise construction of eight miles of 8-in. to 12-in. terra cotta sanitary sewers.

Elgin, Ill.—City will construct sewers during year in 5th st., cost $88,000, and Seventh Ward, $72,000.—C. E. Plum, City Engineer.

Elgin, Ill.—Board of Local Improvements has passed resolutions for sewers in Locust and Villa st.; cost $9,140 and $5,786, respectively.—Carl E. Plum, City Engineer.

Moline, Ill.—City is considering laying of 11,145 ft. of sewer at cost of $14,950.—C. G. Anderson, City Civil Engineer.

Momence, Ill.—Board of Local Improvement has decided to construct combination storm and sanitary sewer; cost about $50,000.

Pekin, Ill.—Aldermen have confirmed action of Board of Local Improvements in engaging services of Engineers Alvord and Burdick as supervising engineers of North Side sewer.

Rockford, Ill.—Board of Local Improvements is considering construction of 5,000 ft. storm sewer; cost $14,801.

La Porte, Ind.—Prof. R. L. Sackett, Sanitary Engineer of Purdue University, has submitted plans and specifications for construction of sewer system, length three miles; cost $126,947.

Vincennes, Ind.—Council has again taken up installation of sewer system; plans by E. F. Layman, Cincinnati, and C. C. Brown, Indianapolis, considered.

Birmingham, Ala.—Street paving bids received on January 19 at the office of Maury Nicholson, City Engineer, for paving six blocks of Sixth ave.: (a) Filbert Paving Co., filbertine; (b) Southern Bit. Co., asphalt; (c) Thos. J. McGovern, asphalt; (d) Southern Bit. Co., bithulithic; (e) F. B. Jamison & Co., brick; (f) Crockett Pav. Co., brick (g) B'ham Paving & Contracting Co., brick; (h) R. S. Blome & Co., granitoid; (j) Graves-Mathews Paving Co., brick; (k) Metropolitan Const. Co., asphalt; (l) Southern Pav. & Const. Co., brick; (m) Dunn & Lallande Bros., brick; (n) Memphis Asphalt & Paving Co., asphalt; (o) B'ham Paving Co., rock asphalt.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(J)	(K)	(L)	(M)	(N)	(O)
14,800 sq. yds. paving....	$1.48	$1.64	$1.59	$1.75	$1.835	$1.845	$1.87	$1.89	$1.89	$1.88	$1.92	$1.90	$1.99	$1.25
1,000 sq. yds. track paving	2.10	1.85	2.10	1.85	1.835	1.845	1.87	1.89	1.89	2.02	1.92	1.95	1.99	1.95
1,200 sq. yds gutter paving	2.00	1.85	2.00	1.85	1.835	1.845	1.87	1.89	1.89	2.00	1.92	1.90	1.99	1.95
3,400 lin. ft. reset curb...	.10	.08	.10	.08	.07	.08	.10	.08	.10	.12	.08	.08	.15	.08
100 lin. ft. new curb.....	.50	.50	.50	.50	.50	.49	.50	.50	.50	.50	.50	.50	.52	.55
150 lin. ft. new (cir.) curb.	.60	.55	.60	.55	.50	.49	.55	.60	.60	.50	.50	.50	.55	.55
Totals without track.....	24,784	26,896.50	26,412	28,524.50	29,723	29,914.50	30,392.50	30,652	30,720	30,757	31,117	30,797	32,484.50	21,249.50
Guarantee totals.....	520	800	1,356	800	800	800	800	800	800	480	320	776	764	208

13th st., 12th ave. and 12th st., (a) total $19,238, guarantee $234; (b) $29,839, $740; (c) $20,184, $806; (d) $20,785, $740; (e) $21,469.50, $740; (f) $21,586.50, $740; (g) $21,879, $585; (h) $22,113, $585; (j) $22,113, $585; (k) $22,430, $585; (l) $22,464, $234; (m) $22,557, $678; (n) $23,283, $585.

15th st., (a) total, $19,316, guaranteed, $254; (b) $21,038, $635; (c) $20,603, $1,073; (d) $22,325, $635; (e) $23,304.50, $635; (f) $23,431.50, $635; (g) $23,749, $635; (h) $24,003, $635; (j) $24,003, $635; (k) $23,996, $381; (l) $24,130, $254; (M) $23,876, $889; (n) $25,273, $605; (o) $16,425, $1,220.

16th st., (a) total $24,788, guaranteed $321; (b) $26,860.50, $802; (c) $26,394, $1,341; (d) $28,466, $802.50; (e) $29,662.75, $802.50; (f) $29,845.25, $802.50; (g) $30,293.50, $802.50; (h) $30,568, $802.50; (j) $30,614.50, $802.50; (k) $30,674, $481.50; (l) $30,729, $321; (m) $29,926.50, $802.50; (n) $32,336.50, $759; (o) $21,094, $218.50.

14th st. (a) total $15,138, guaranteed $200; (b) $16,536.50, $500; (c) $16,166.50, $854.50; (d) $17,565, $500; (e) $18,350, $500; (f) $18,450, $500; (g) $18,700, $500; (h) $18,900, $500; (j) $18,900, $500; (k) $18,878, $300; (l) $19,200, $204; (m) $19,200, 5500; (n) $19,900, $480.50.

17th ave. (a) total $17,072, guarantee $214; (b) $18,286, $535; (c) $18,106, $872: (d) $19,320, $535; (e) $20,047.50 $535; (f) $20,199.50, $535; (g) $20,564, $535; (h) $20,693, $535; (j) $20,783, $535; (k) $20,912, $535; (l) $21,004, $214; (m) $21,004, $535; (n) $22,075, $496.

19th st. (a) total $18,959, guarantee $242; (b) $20,555.50, $605; (c) $20,205, $1,033; (d) $21,798.50, $605; (e) $22,782.50, $605; (f) $22,856.50, $605; (g) $23,254.50, $605; (h) $23,420, $605; (j) $23,504, $605; (k) $23,548, $605; (l) $23,768, $242; (m) $23,775.50, $605; (n) $24,921, $605.

4th ave. (a) total $12,936, guarantee $164; (b) $13,899, $410; (c) $13,728, $648; (d) $14,691, $410; (e) $15,264, $410; (f) $15,363, $410; (g) $15,609, $410; (h) $15,744, $410; (j) $15,798, $410; (k) $15,840, $410; (l) $15,980, $164; (m) $16,000, $410; (n) $16,680, $370.

The details of these bids are practically the same in each case as given in the table herewith for the 6th ave. work.—Maury Nicholson, City Engineer.

Peabody, Kan.—Council has passed ordinance organizing Sewer District No. 1.

Lexington, Ky.—Joint Improvement Committee will ask for $68,000 appropriation; $5,000 is for storm water sewers and repairs and building new crossings.

Mt. Sterling, Ky.—City has sold $50,000 sewer bonds to Union Savings Bank of Cincinnati, O., for $51,156.

Haverhill, Mass.—Council is considering $25,000 expenditure for sewer system in Upper Ward 6.

North Adams, Mass.—City Engineer Roswell L. Gardner has made preliminary surveys for construction of sewers in western end of city.

Saginaw, Mich.—Common Council is considering bids for the construction of a sewer on Ellsworth st.

Duluth, Minn.—Cost of Woodland sewer has been estimated at $138,352.50; length two miles; Tischer's Creek will be crossed by concrete frost box.

Belzona, Miss.—Surveys are being made by Walter G. Kirkpatrick, Jackson, for construction of system of house sewers.

Greenwood, Miss.—City has $30,000 available for construction of storm water drainage system.

Kansas City, Mo.—Board of Public Works will let contract about Feb. 15 for construction of Brush Creek sewer.—Jas. L. Darnell, City Engineer.

St. Joseph, Mo.—Council has passed ordinance to construct sewers in six districts.

St. Joseph, Mo.—Board of Public Works will let contracts in April for construction of sewers, including 7,000 ft. of 10 and 12-in. vit. pipe, 7,000 ft. of 4-ft. vit. brick or concrete and 300 ft. of 36-in. vit. brick or concrete.—Geo. F. Barnes, Secretary; W. K. Seitz, Assistant City Engineer.

Falls City, Neb.—Plans are being prepared by Consulting Engineer Hiram Phillips, Frisco Bldg., St. Louis, Mo., for sewer system; cost $50,000.

Camden, N. J.—Council has ordered construction of sewers in three streets.—I. V. Bradley, Clerk.

Newark, N. J.—Board of Works has decided to construct proposed storm water sewer in Vailsburgh section; cost $230,000.

Roselle Park, N. J.—Citizens have voted $54,000 bonds to extend sewer system.

Trenton, N. J.—Assistant Engineer Alfred C. Gregory has been selected by Council's Finance Committee to look after details of installing proposed sewage disposal plant, and to work in conjunction with expert engineer on sewerage to be soon selected.

Ventnor City, N. J.—Council has decided to secure services of Engineer Phelps, Newark, to supervise plans and specifications for modern system of sewage disposal.

East Las Vegas, N. M.—Construction of sewer system has again been taken up.—Alderman Martin, Chairman Committee on Public Works.

Rome, N. Y.—Engineers Knight and Hopkins have estimated cost of installing proposed sewage disposal plant as follows: gravity broad irrigation plant at $229,054; sprinkling filter plant, $128,000; sand filtration plant, $158,260, and broad irrigation plant, involving about one mile of iron force mains, $108,640.

Carrington, N. D.—Installation of public sewer system, cost $75,000, is being considered.

Ashtabula, O.—Council has decided to construct sanitary sewer in Joseph st.

Cincinnati, O.—Council will consider ordinance looking to construction of sewage disposal plant. Councilman H. J. Cook is interested.

Collinwood, O.—Council has decided to construct sewer in Collomer st.—J. F. Murray, Clerk.

Glendale, O.—Citizens have defeated $40,000 bond issue for coustruction of disposal plant and trunk sewer.

Hamilton, O.—City has sold $16,589 sewer bonds to Ohio Savings Bank & Trust Co.

Hamilton, O.—Council is considering resolution instructing City Civil Engineer to prepare plans for sanitary sewers on seven streets; Engineer L. A. Dillon has estimated cost of sanitary main line sewer and house connections in Sycamore st. at $4,608.

Mansfield, O.—Council is considering construction of sewer in Hammond ave.

Ardmore, Okla.—City has selected J. W. Maxcy Co., 906 Scanlan Bldg., Houston, Tex., as Consulting Engineer for sewerage system.

Ashland, Ore.—City will install lateral sewer on 1st ave.

Vale, Ore.—Parrott, Cottrell & Parrott, Baker City, will survey city for sewer system.

Altoona, Pa.—City Engineer Frank Engstrom is planning to lay line of pipe to mill run in order to carry off storm water on 27th st.

Harrisburg, Pa.—Council is considering ordinance for construction of pipe sewers in three streets.

Hastings, Pa.—Abbott & Howells will draw up plans and specifications for proposed sewer system and sewage disposal plant.

Johnstown, Pa.—Construction of storm sewer in Fifth Ward is being considered.

Parsons, Pa.—Citizens will vote in February on $50,000 bonds for installation of sewer system.

Wyoming, Pa.—Plans are being prepared by Engineers Young & Wintermute, 410 Second National Bank Bldg., for gravity system of sewers.—W. T. Hutchins, Chairman Sewer Committee.

Rock Hill, S. C.—Citizens will vote Feb. 24 on $50,000 sewerage bonds.

Cleveland, Tenn.—Bids will be received about April 1 for construction of sewer system and disposal plant; cost $50,000.—Solomon-Norcross Co., Atlanta, Ga., Engineers.

Murfreesboro, Tenn.—Mayor has recommended appointment of committee to investigate question of constructing sewer system.

Lubbock, Tex.—Plans have been prepared for construction of about 15 miles of sewers.—E. L. Datton, Juanita Bldg., Dallas, Engineer.

Roanoke, Va.—Citizens will vote March 24 on $75,000 bonds for sewer construction.

Edmonds, Wash.—Citizens will vote Feb. 8 on $17,000 bonds for a system of trunk sewers.

Monroe, Wash.—Bids will be received in March for a trunk sewer; cost $15,000.—Arthur L. Root, Town Clerk.

Seattle, Wash.—City Engineer R. H. Thomson has estimated cost of constructing sewers in 36th ave. at $39,000.

Huntington, W. Va.—Citizens will vote on $300,000 bonds for paving and sewer construction.

Beloit, Wis.—City will lay sanitary sewers on four streets.

Milwaukee, Wis.—City Engineer has recommended construction of relief sewer, 6 and 7 ft. diameter, on four streets; cost about $25,000.

Oconomowoc, Wis.—Board of Public Works will construct storm sewers on four streets.

Racine, Wis.—Installation of Blue River sewer will cost $8,700.

Vancouver, B. C., Can.—Provincial Public Works Department, Victoria, is considering plans for construction of sewer in Nanaimo st.—F. C. Gamble, Engineer.

CONTRACTS AWARDED

Denver, Col.—Sanitary sewer, with branches to be about 30 miles in length, to Dennis Gibbons, for $587,660; other bidders, Municipal Construction Co., $636,801; Chas. Connor, $657,363, and Gaffey & Keefe, $687,667.

Quincy, Fla.—Sewer system, to Sullivan & Long, Bessemer, Ala., $18,994; work includes 7½ miles of pipe sewers, 72 manholes, 20 flush tanks and one septic tank.

Collinsville, Ill.—Sanitary sewer, District No. 2, to A. W. Eisenmeyer, $15,300; work includes septic tank, and the following approximate quantities: 10,727 lin. ft. of 8-in. vit. pipe sewer, 4,017 lin. ft. of 10-in. vit. pipe sewer, 1,379 lin. ft. of 12-in. vit. pipe sewer, 120 lin. ft. of 12-in. standard c. i. pipe sewer, 36 brick manholes, 16 flush tanks, 10 vit. pipe lampholes, 210 cu. yds. of concrete.

Indianapolis, Ind.—Parkway ave. sewer, to J. E. Sullivan, 3,225 N. Illinois st., $30,924.

St. Paul, Minn.—Otto ave. and other sewers, opened Jan. 17, to John Lind, 34 E. 2d st., $6,350.—M. J. McMahon, Clerk Board Public Works.

BIDS RECEIVED

Denver, Col.—District sewers in West and South Side sanitary sewer district, Dennis Gibbons, low bidder, at about $589,700; other bidders: Gaffy & Keefe, $687,668; Charles Connor, $657,364; Municipal Construction Co., $636,801.

Washington, D. C.—Branch sewer in 10th st. and in Chelten ave., David McMahon, low bidder, $4,296.

Holton, Kan.—45,000 ft. 8-in. sewer, 64 m. h., 35 ft.; about 14,000 ft. 10, 12 and 15-in. sewer, 41 m. h., and disposal plant, to S. M. Kerns, Denver, Col., for $41,366. Other bids received were: Reed & Tripp Co., Clay Center, Kan., $64,799; McKay & Cathroe, Omaha, Neb., $62,974; W. H. Harris, Terre Haute, Ind., $57,776; Boyd Constr. Co., Kansas City, Kan., $57,388; Johnson Constr. Co., Kansas City, Mo., $55,545; H. C. Gass, Belleville, Ill., $55,066; Land Constr. Co., St. Joseph, Mo., $53,926; Meredith & Erler, Terre Haute, Ind., $51,888; General Constr. Co., Bartlesville, Okla., $51,839; McGuire & Stanton, Leavenworth, $49,843; G. O. Skilbred, St. Joseph, Mo., $43,777, not including disposal plant; Smith & Sons, Webb City, Mo., $45,056; H. E. Maynard, Kansas City, Mo., $12,400 on disposal plant only; Hartman Bridge Constr. Co., St. Joseph, Mo., $6,830, disposal plant only.

Pelham, N. Y.—Sewer system, to Sillery & Piro, Mt. Vernon, at following bid: Vitr. sewer pipe, 26,960 lin. ft. of 8-in., 19c.; 3,951 lin. ft. 10-in., 27c.; 1,183 lin. ft. 12-in., 37c.; 9,160 lin. ft. 15-in., 50c.; 1,000 ft. 6-in. vitr. pipe verticals, 10c. Trench, 15,438 lin. ft. 6 ft. deep, 25c.; 14,592 lin. ft. 6 to 8 ft. deep, 30c.; 3,790 lin. ft. 8 to 10 ft. deep, 38c.; 2,650 lin. ft. 10 to 12 ft. deep, 50c.; 805 lin. ft. 12 to 14 ft. deep, 75c.; 1,181 lin. ft. 14 to 16 ft. deep, $1; 1,522 lin. ft. 16 to 18 ft. deep, $1.30; 545 lin. ft. 18 to 20 ft. deep, $1.60; 375 lin. ft. 20 to 22 ft. deep, $1.90; 1,500 cu. yd. rock in trench, $3.75. Manholes, 62 up to 6 ft. deep, $30; 18 from 6 to 8 ft. deep, $35; 7 from 8 to 10 ft. deep, $43; 4 from 10 to 12 ft. deep, $52; 7 from 12 to 14 ft. deep, $62; 4 from 14 to 16 ft. deep, $72; 3 from 16 to 18 ft. deep, $82; 5 from 18 to 20 ft. deep, $92; 1 from 24 to 26 ft. deep, $102; 3 standard 8-in flush tanks, each $100; 1 ton c.-i. pipe and specials, $50, etc. Total, $38,350. Totals of other bids: Clarke & Co., Ltd., Morristown, N. J., $42,458; Michael Marrone & Felix Gasperani, New York City, $12,758; Jas. J. Fusco, Newark, N. J., $47,542; Wm. M. Acheson, Troy, N. Y., $46,375; O'Leary & Flanagan, New York City, $47,035; New York Interurban Development Co., Mt. Vernon, N. Y., $47,186; Briggs & McLaughlin, New York City, $47,931; Frank Nordone, Mt. Vernon, N. Y., $50,592; Ryan & Reilly, Baltimore, Md., and Philadelphia, Pa., $51,542; Smith Bros., Pelham, N. Y., $53,812; Saml. Bonn, Syracuse, N. Y., $59,929; L. I. Engineering & Contr. Co., Long Island, N. Y., $65,391.—Harold B. Roberts, 103 Park ave., New York City, Village Engineer.

Syracuse, N. Y.—Four sewers, Albert Gaffey, 116 Sand st., low bidder,, $3,501.

WATER SUPPLY

Boaz, Ala.—City is considering construction of water works.—R. E. Boroughs, E. G. Williamson and J. P. Gillespie, Special Committee.

Mobile, Ala.—C. W. Soost, Superintendent of Water Department, has recommended use of meters, substitution of concrete or brick walls in place of wood sluiceway curbing at Spring Hill station, and continuance of cross-connections between mains of two systems throughout city.

Montgomery, Ala.—Council authorized purchase of site for construction of proposed reservoir and installation of electrically operated water pump.

Hamburg, Ark.—City will install water works. Dr. W. L. Blanks is interested.

Fullerton, Cal.—City Trustees have sold a franchise for domestic water system to Mrs. Gertrude B. Miller, of New York; cost about $40,000.

Lindsay, Cal.—Plans are being prepared by Architect Norman F. Marsh, 206 Broadway Central Bldg., Los Angeles, for reinforced concrete tower, 45 to 50 ft. high, and 3,000-gal. water tank.

Sacramento, Cal.—East Sacramento Water Co. will apply for franchise and erect suitable buildings; capital $250,000. H. J. Goethe, G. P. Beere, H. A. McClelland, H. T. Goethe, Thos. Oates, Peter Zingg and Albert Elkus, incorporators.

San Bernardino, Cal.—Plans will be prepared by City Engineer for 20-in. pipe line to connect Antil pumping plant with proposed city reservoir at Lyttle Mountain.

Hartford, Conn.—Water Board has voted that citzens vote April 5 on preference for addition to water supply; it is planned to take water either from Connecticut River and purifying it or from Nepaug River.

New Britain, Conn.—Engineer Percy M. Blake, Water Department, has recommended increasing of water supply system.

Waterbury, Conn.—Bids will be opened early part of March for laying c. i. pipe line from new dam in Morris to connection with main leading to city.—R. A. Cairns, City Engineer.

Dalton, Ga.—Council has decided to install boiler at water works.

Shellman, Ga.—Town will expend $8,000 in water works improvements and extensions.

Benton, Ill.—Hamilton Utilities Co. will construct a water and light plant.

Eureka, Ill.—Plans are being prepared for improvements to present water works system.

Greenview, Ill.—Citizens are considering $3,000 appropriation for water main extensions.

Moline, Ill.—City is considering laying of 2,666 ft. of water main at cost of $3,685.—C. G. Anderson, City Civil Engineer.

Peoria, Ill.—Council has selected Benezet Williams, Chicago, to appraise pumping plant and system of Peoria Water Works Co.

Quincy, Ill.—Superintendent Gelston, of Citizens Water Works Co., has recommended purchase of high duty pump of 6,000,000-gal. capacity.

Salem, Ill.—City will install a municipal water works this spring.—C. E. Hull, Mayor.

Union, Ill.—Artesian well will be drilled. John W. Gidden, De Kalb, is interested.

Vermont, Ill.—Town has issued water works bonds.

Waukegan, Ill.—Board of Local Improvements has passed resolutions for constructing water mains in various streets.—Al. Rogers, Clerk.

Ft. Wayne, Ind.—Board of Public Works will soon let contracts for new material, equipment and supplies for municipal water works.

Richmond, Ind.—Mayor Zimmerman has recommended municipal ownership of water works.

Burlington, Ia.—Des Moines County Supervisors will erect pumping station, including buildings and machinery.

Arkansas City, Kan.—Council has decided to call election on $55,000 bonds for the extension of city water works plant.

Frontenac, Kan.—Construction of water works system is being considered.

Junction City, Kan.—Captain Whetman, Constructing Quartermaster, has received orders to prepare plans and specifications for remodeling and repairing of entire water works system at Fort Riley.

Wichita, Kan.—Mayor C. L. Davidson has recommended purchase of water works, also the calling of an election on bonds for building concrete dam at Central ave. crossing of Little River.

Jeffersonville, Ky.—Jas. P. Goodrich, Richmond, Ind., has purchased plant, franchise and equipment of Jeffersonville Water Supply Co.; plant will be improved.

Paintsville, Ky.—G. A. Northcott, Huntington, W. Va., is interested in construction of water works and electric light plant; cost $40,000.

Attleboro, Mass.—City has sold $15,000 water bonds to Estabrook & Co.

Boston, Mass.—Mayor Hibbard will ask Legislature for permission to expend $1,000,000 for high pressure water system for fire protection.

Boston, Mass.—Water Board is urging installation of 16-in. water main to supply high pressure needs of Arlington and Lexington; also laying of main in East Boston; tota cost $115,000.

Lynn, Mass.—Council has endorsed plan known as cleaning mechanical filtration plant for purification of water supply; cost $228,275; annual operation expenses $28,291.

New Bedford, Mass.—Fire Chief Dahill has recommended extension of water service to Lunds Corner.

Peabody, Mass.—Question of water system for Overlea is being discussed.

Springfield, Mass.—City has awarded $378,000 water bonds to Perry, Coffin & Burr.

Battle Creek, Mich.—City has purchased new pump for water works station to supplant two old pumps.

Flint, Mich.—Council is considering proposition to purchase new pump with capacity of 7,000,000-gals. daily.

Saginaw, Mich.—Citizens will vote in Feb. on bonds for reconstruction of water system.—D. C. Bell, City Clerk.

Beatrice, Neb.—Wymore Council is searching for pure water; wells will be sunk.

Falls City, Neb.—City is considering improvements to its water works system; cost $10,000.—Hiram Phillips, Frisco Bldg., St. Louis, Mo., Consulting Engineer.

Bridgeton, N. J.—Commissioner of Public Works Woodruff has recommended sinking of more wells which would mean changes to suction storage tank and treatment of water between pumpings; C. S. Potts has been recommended as engineer.

Dover, N. J.—Water Commissioners are considering installation of large electric motor and laying another pipe line to reservoirs.

Newark, N. J.—Board of Works will ask Council for $100,000 bond issue for extension of high pressure and water mains.

Paterson, N. J.—Mayor McBride has asked Mayor Crawford, of Montclair, to join with him and Mayors of several other municipalities in trying to secure Wanaque Valley supply.

Farmington, N. M.—Town Board will call election on $25,000 water works bonds.

Buffalo, N. Y.—Bids will be received Feb. 7 by Wm. G. Justice, City Comptroller, for $500,000 water bonds.

Cincinnati, O.—Council has passed ordinance providing for issuance of $200,000 bonds for improvements of water works.

Cincinnati, O.—City is considering issuance of $200,000 bonds for betterment of water works.

Geneva, O.—Council has had plans prepared for water works dam at pumping station on Grand River and for making other improvements; cost $10,500.—Henry Means, Mayor.

Sandusky, O.—Council has appropriated $7,000 for about one-half mile of 12-in. and one-quarter mile of 6-in. water main.

Claremont, Okla.—City is considering issuance of $17,500 water works bonds.

Krebs, Okla.—City will advertise for bids for furnishing and constructing complete water system; cost $50,000.—R. E. Seamans, Mayor.

Cottage Grove, Ore.—Engineer J. W. Roberts has estimated cost of proposed water system, including reservoir, at $103,-319.

Newberry, S. C.—City will expend $5,000 on water works extensions.

Rogersville, Tenn.—City will take up matter of installing water system during year.

Austin, Tex.—City is considering increasing of water supply.

Harlingen, Tex.—Lakeside Water Co. has been incorporated by R. S. Chambers, F. B. Chambers and H. L. Hopkins.

Paris, Tex.—Citizens will vote Feb. 24 on $20,000 bonds for extension of water mains.

Rosenberg, Tex.—City is considering extension of water works.

Tremonton, Utah.—Citizens will vote Feb. 8 on bonds for installation of water works.

Fredericksburg, Va.—Council is considering laying of additional water mains; cost $6,000.—S. J. Quinn, Superintendent Water Works.

Fredericksburg, Va.—Water Works Committee, Chairman Rowe, will consider increase of water supply; cost $6,000.

Norfolk, Va.—Board of Control has advertised for bids on water distributing materials for Granby, Chapel and Queen sts.

Brandon, Vt.—Fire District No. 1 has decided to extend water system at cost of $8,000.

Aurora, Wash.—Installation of water works system is being considered.

Everett, Wash.—Mayor Hartley has appointed Councilman Bardon chairman of committee to investigate water question.

North Yakima, Wash.—Council has passed ordinance rendering void ordinance calling for election Jan. 30 on $315,000 bonds for purchase of water plant of Northwest Light & Water Co.

Walla Walla, Wash.—Water Committee will purchase carload of 6-in. and 8-in. pipe.

Charleston, W. Va.—West Charleston Water Co. has been incorporated to construct and maintain water works in West Charleston; capital stock $10,000. Incorporators are W. B. Shober, Albert Lory and P. Burdett.

Martinsburg, W. Va.—Bids will be received Feb. 7 for $40,000 water works bonds.—P. W. Leiter, City Recorder.

Beloit, Wis.—City will lay water extension mains on six streets.

Burlington, Wis.—Plans are being prepared by City Engineer P. J. Hurtgen for extension of water system on several streets.

La Crosse, Wis.—City Engineer Bradish has completed the preliminary plans for pump house and sedimentation basin; cost $190,000.

Worland, Wyo.—Town will soon vote on $40,000 bond issue for modern system of water works.—C. F. Robertson, Mayor.

Tofield, Alta, Can.—Engineer Tait of the Grand Trunk Pacific is preparing plans and making surveys for proposed water supply plant.

CONTRACTS AWARDED

Springfield, Ill.—275 meters, to Badger Meter Co., Milwaukee, $6.10 each.

Fort Scott, Kan.—3,000,000-gal pump, to Platt Iron Works, Dayton, O., $4,800.

Cheboygan, Mich.—Deepening water works well, to Franz Jahnecke, Alpena.

Perth Amboy, N. J.—Extension, ground storage system, Runyon, to C. P. Hodgson, Metuchen, $23,759; other bidders, W. G. Quackenbush, $27,164; Dominick Bonacci, Brooklyn, $26,780; Holmes & Cogan, Jersey City, $26,500; Liddle & Pfeiffer, city, $25,-835.

Albuquerque, N. M.—Furnishing centrifugal pumps, to Henry R. Worthington, New York City, $2,783, and motors, to Nash Electrical Supply Co., city, $3,230.—J. B. McManus, City Clerk.

Wilmington, N. C.—Remodeling and enlargement of system to J. W. Danforth & Co., Buffalo, N. Y.; cost about $60,000.—C. W. Worth, Chairman Water and Sewerage Commission.

Dodgeville, Wis.—Steel tank, to Kennicott Water Softener Co., Chicago Heights, Ill., for about $2,051.

Two Rivers, Wis.—Water & Light Commissioners have instructed Superintendent to exchange old water tapping machine and $50 for complete No. 1 Mueller water tapping machine.

BIDS RECEIVED

New York, N. Y.—Contract 54, portion of Yonkers siphon, deep pressure tunnel, 16 ft. 7 in. inside diameter, and about 2 m. long, reached through three shafts from 100 to 150 ft. in depth, and a connection chamber with appurtenant works; approximate totals of bids: Dravo Constr Co., Pittsburg, Pa., $1,726,405; T. A. Gillespie Co., 90 West st., $1,591,330; McArthur Bros., 7 Pine st., $1,-647,210; Keystone State Constr. Co., $1,759,-525; Henry P. Burgard, $1,868,320; P. McGovern, $1,596,680; Geo. W. Jackson, Inc., Chicago, Ill., $1,479,425; Breuchard-Winston Co., 290 Broadway, $1,880,725; J. T. Coogan, Brewster, N. Y., $1,701,200; Carter Contr. Co., 134 LaSalle st., Chicago, Ill., $1,716,555.

Dodgeville, Wis.—Bids received Jan. 11: Cypress tank 22 ft. x 24 ft., Wendnagel & Co., Chicago, Ill., $1,950; Flint & Walling Mfg. Co., Kendallville, Ind., $1,450; Olson Bros., Chicago, $2,350; Minnesota Tank Co., Minneapolis, $2,000; American Tower & Tank Co., Elgin, Il., $1,900.

(A) Steel Tank, flat bottom, 22 ft. x 24 ft., and (B) Steel Tank, 16 ft. x 35 ft., hemispherical bottom.

S. Freeman & Sons, Racine, A—$3,700; B—$3,000; Optenberg Iron Works, Sheboygan, A—$2,885; B—$2,838; Chicago Bridge & Iron Works, Chicago, Ill., A—$2,800; B—$2,290. Kennicott Water Softener Co., Chicago Heights, Ill., A—$2,051; B—$1,738. The Canton Boiler & Engine Co., Canton, O., A—$2,721; B—$2,510.

LIGHTING AND POWER

Bessemer, Ala.—Alderman Carlisle has estimated cost of establishing 500 k.w. electric light plant of 20,000 16 c. p. lamps at $100,000.

Hamburg, Ark.—City will install water works and electric light plant; $30,000 bonds are available. Dr. W. L. Blanks is interested.

Little Rock, Ark.—Council has granted B. G. Dawes, Chicago, natural gas franchise.

Fitchburg, Cal.—Installation of lights on main thoroughfare is being urged.

Lodi, Cal.—Board of Trustees will soon take up matter of installation of lights; power will be produced from American River Power Co.

Pomona, Cal.—Edison Electric Co. plans to expend during year about $100,000 in improvements.

Stockton, Cal.—Contracts will soon be let for installing special lighting system on business streets; $30,000 will be expended.

Boulder, Col.—Boston-Colorado Power Co., capital $2,000,000, will construct power plant about April 1.—G. W. Teal, city, Engineer in charge.

New Britain, Conn.—City Engineer F. H. Oldershaw will formulate plans for extension of present conduit system for low and high potential wire on Main st., length 1,500 ft.

Madison, Fla.—Madison Electric Co. is considering extension and improvement of transmission lines.—J. W. Reeve, Jr., Manager.

Tallahassee, Fla.—Board of Managers City Water and Light Plants, desires prices on furnishing and erection of gas holder of 20,000 to 30,000 cu. ft. capacity.

West Palm Beach, Fla.—Ariston Ice & Electric Co. is considering installation of additional 60-kw. generator and engine and making other improvements to electric light system.—H. C. Adams, Manager.

Milledgeville, Ga.—Extension of electric light system is being considered.

Springfield, Ill.—City is considering $20,000 expenditure for new machinery for lighting plant and equipments necessary for 200 lamps.

Springfield, Ill.—Park Board is considering removal of all poles on 4th st. and erection of electric boulevard lamps.

Washington, Ill.—R. M. Howard has purchased local electric works.

Bluffton, Ind.—Marion, Bluffton & Eastern Traction Co., acting in conjunction with Bluffton, Geneva & Colina Co., now building from Bluffton eastward, has submitted to city proposition to buy municipal lighting plant and establish one large central power plant, capable of operating combined 78 miles of road of the two companies and of lighting streets and supplying commercial lighting for the city and all other cities and towns along lines of the two roads.

Crawfordsville, Ind.—Crawfordsville Electric Light & Power Co. is considering construction of new electric light plant.—J. R. Thomas, Superintendent.

Dana, Ind.—Electric light plant has been destroyed by fire; loss $6,000.

Edinburg, Ind.—Municipal electric light plant is considering repoling of entire line and installation of meters, giving both day and night service.

Elkhart, Ind.—Indiana & Michigan Electric Co. is preparing to build another dam in St. Joseph River.—F. A. Bryan, General Manager.

Elwood, Ind.—Council has passed resolution giving Light Committee power and instructing it to advertise for bids for furnishing power for lighting of city; present 10-year contract expires in February and another contract for similar period of time will be let at February meeting; Council has asked for bids for open and electric street lights of 2,000 nominal candle power; bids also required for not less than 100 lights of 6 6-10 ampere alternating enclosed arc lights.

Indianapolis, Ind.—Mayor Shank is fa-

vorable to construction of electric light plant and cold storage plant in Market House sq.; cost $100,000.

Marion, Ind.—Continental Construction Co. is seeking artificial gas franchise; $20,000 plant will be erected.

Boone, Ia.—Boone Electric Co. has had plans prepared for rebuilding plant.

Davenport, Ia.—Davenport Water Power Co. will soon construct proposed plant; plans being prepared.—F. H. Driggs, President.

Pocahontas, Ia.—Citizens have voted to construct municipal lighting plant.—Geo. Schnieders, Town Clerk.

Villisca, Ia.—Clarinda Electric Lighting Co. has asked for 25-year franchise.

Hutchinson, Kan.—Establishment of lights on East A st. is being urged.

Moran, Kan.—Whitman & Bettes, Chanute, will ask Council for gas franchise.

Greenfield, Mass.—Greenfield Electric Light & Power Co. will erect a new boiler building and install a 750-kw. G. E. horizontal turbine.—G. W. Lawrence, Superintendent.

Leominster, Mass.—Establishment of central heating plant is being considered.

Middleboro, Mass.—Municipal Light Commissioners have decided to extend lighting service to North Middleboro, distance five miles.

Winchendon, Mass.—Edw. H. McClintock and Chas. T. Main, of Boston, are making surveys looking to construction of a dam for Winchendon Electric Light & Power Co.

Benton Harbor, Mich.—Plant of Benton Harbor & St. Joseph Gas Co. has been destroyed by explosion.

Detroit, Mich.—Council is considering proposition to amend the charter so as to allow city to enter field of competition for commercial lighting.

Kalamazoo, Mich.—Kalamazoo Gas Co. has petitioned Council for extension of franchise.

Mendon, Mich.—Citizens have voted to purchase the Stofflet Mill and develop the water power for operating city lighting plant.—T. Z. Eveland, Village Clerk.

Port Huron, Mich.—Bids have been called for gas meter testing apparatus.

Elysian, Minn.—Cannon Valley Electric Light & Power Co. has applied for franchise to furnish light and power to village.

Faribault, Minn.—Faribault Electric Light Co. will extend its line to supply Morristown, Waterville, Elysian, Madison Lake and Eagle Lake with power and light.

Ruleville, Miss.—Ruleville Light, Ice & Coal Co. will rebuild electric light plant destroyed by fire.

Chillicothe, Mo.—Fuller Consulting Engineering Co., 721 Olive st., St. Louis, is preparing plans for electric light plant; $50,000 bonds available.

St. Joseph, Mo.—Council has passed resolution authorizing Electric Light Committee to investigate system of burning crude oil.

Cape May, N. J.—Board of Trade will suggest to Council more striking system of lighting boardwalk by means of arches and tungsten lamps in place of arc lights.

New Brunswick, N. J.—Committee will be appointed to ascertain cost of electric and gaslight plant.—J. J. Morrison, Mayor.

Auburn, N. Y.—Extensive improvements are to be made to local plant of the Auburn Gas Co. immediately that will cost about $100,000.

Binghamton, N. Y.—Application has been made to Public Service Commission, Second District, by Binghamton Gas Works to issue $23,000 bonds for construction, completion, extension and improvement of its plant and distributing system and improvement of its service.

Brooklyn, N. Y.—Kings County Electric Light & Power Co. will issue $2,500,000 debenture bonds; proceeds for extension of business of company.

White Plains, N. Y.—Board of Village Trustees will direct Westchester Lighting Co. to place 31 incandescent lights and arc light at places designated.

Canton, N. C.—Canton Lighting Co. has been incorporated, $25,000 capital, by J. N. Mease, G. N. Henson and others.

Durham, N. C.—Durham Traction Co. will erect addition to power house and install slow-speed Corliss engine of 1,500 h. p.

Ashtabula, O.—Council has appropriated $13,500 for new buildings and equipment for municipal electric lighting plant.—Chase Palmer, Superintendent.

Springfield, O.—Mayor C. J. Bowlus is urging that city take steps to install electric lighting plant that will furnish light for public buildings and streets. Service Director Jacob Klein and City Solicitor R. V. Smith have been asked for data regarding lighting.

El Reno, Okla.—El Reno Interurban Railway Co. will install electric plant to furnish electricity to operate electric railway.

Altoona, Pa.—Mayor Hoyer has approved ordinances for 12 additional lamps.

Pottstown, Pa.—Company of capitalists has been organized at Frick's Lock, to install acetylene and electric lighting systems in homes of farmers.

Greenville, S. C.—Southern Power Co. will erect plant for electric power.

Rogersville, Tenn.—Rogersville Electric Light & Power Co. will at an early date make application to Board of Mayor and Aldermen for franchise to use streets for purpose of transmitting electricity for lighting streets, public and private buildings and for transmission of power.

Bryan, Tex.—City has granted franchise to Mr. Cleaver and associates for electric light plant and water works; cost $60,000.

Woodward, Tex.—Hust & Brundage and J. S. Sweet, San Antonio, are considering construction of electric light and power plant.

Norfolk, Va.—Board of Control has asked for bids for stationery and electrical supplies for electrical department.

Montpelier, Vt.—Placing of telephone and light wires underground is being urged.

Everett, Wash.—Sultan Railway & Power Co. is considering construction of another electric power plant.

Clintonville, Wis.—Extensions and improvements to municipal electric light plant are being considered, including the installation of district steam or hot-water heating system.—John Kuester, Superintendent.

Port Washington, Wis.—Milwaukee Northern Railway Co. is considering installation in its power station of additional gas engine and dynamo with a rating of 1,500 h. p.

Fort William, Ont., Can.—Ratepayers have voted to spend $19,000 for lamps and line work in connection with electric light system.

Melville, Sask., Can.—Cushing & Weir have been granted 10-year franchise to erect an electric light and power plant; cost $30,000.

Toronto, Ont., Can.—Bids will be received for about 8,000 kw. of 13,200-volt. transformers. Address Electrical Department.

CONTRACTS AWARDED

Los Angeles, Cal.—Lighting streets for one year, to Los Angeles Gas & Electric Co.; cost about $220,000.

Los Gatos, Cal.—Street lighting, three years, to J. D. Farwell, manager Los Gatos Ice, Gas & Electric Co., $6.50 per arc lamp per month and $1 per incandescent lamp per month.

Lavonia, Ga.—Electric light and power plant, to Charles P. Edwards and W. N. Edwards; General Electric Co., Southern office, Empire Bldg., Atlanta, Ga., will install machinery, construct transmission line and wire city.

Iola, Kan.—Drilling gas well, to Gas City Drilling Co., $1,050.

Atlantic City, N. J.—Lighting gas lamp standards, to Frank Brown.

Cohoes, N. Y.—Two gas engines, municipal water plant, to Westinghouse Machine Co., Pittsburg; total cost $50,000.

Pittsburg, Pa.—Electric wiring and fixtures in Memorial Hall, to Iron City Engineering Co., Frick Annex, Pittsburg, $44,832.

Vancouver, B. C., Can.—Two 2,000-kw., 1,800 r. p. m., 60-cycle, 3-phase, condensing steam turbo-generator units, to Allis-Chalmers Co., Milwaukee, Wis.

BIDS RECEIVED

Ft. Williams, Me.—Electric light plant, (a) constructing and remodeling overhead lines; (b) brick sub-station; (c) transformers and watt meters; (d) apparatus for substation: John W. Burrowes Co., Portland, (b) $1,045; G. H. & E. E. Lowell, Portland, (a) $14,452; A. D. Granger Co., New York, N. Y., (a) $7,817; McCay Eng. Co., Baltimore, Md., (a), two bids, $9,480 and $8,689, (c), two bids, $1,063 and $1,164; Westinghouse Electric & Mfg. Co., Baltimore, Md., (c) $1,174, and (d) $1,419; Alfred J. Hixon, Boston, Mass., (a) $9,351, (b) $550, (c) $1,211, (d) $1,691, and for engine lathe, $861.

Stratford, Ont., Can.—From the alternatives possible covered by the Stratford Ontario Water Commissioners' recent specifications for turbine pumps and motors they selected the four units cluch coupled on one bed plate—viz., a 50 K. V. A. synchronous motor and a million Imperial gallon pump and a 100 K. V. A. synchronous motor and a million and a half pump, all running at 1,500 revolutions per minute, with exciter and switchboards, the power being 2,200 volt, 25-cycle, 3-phase electricity. There were many partial tenders, but the complete bids were: (a) $5,185; (b) $5,500, plus bed plate; (c) $6,008, plus bed plate; (d) $9,175; (e) $10,500, as 750 revolutions only. The lowest, (a), for Lancashire motors and Rees Roturbo pumps, was accepted.—J. Davis Barnett, Chairman.

FIRE EQUIPMENT

Phœnix, Ariz.—Council has decided to purchase 1,000 ft. of hose.

Eureka Springs, Ark.—City is considering purchase of hook and ladder truck.

Claremont, Cal.—Purchase of auto chemical engine is being considered.

Fitchburg, Cal.—Site will be purchased for erection of fire house.

Los Angeles, Cal.—Fire Commissioners have recommended purchase of 12,000 ft. of hose.

Oakland, Cal.—Emeryville has selected plans for fire house in which will be installed auto engine.

Oakland, Cal.—Bids will be received Feb. 16, 10 a. m., for one combination chemical and hose wagon.—W. B. Fawcett, Secretary Board of Public Works.

Roseville, Cal.—Trustees Wells and Theile have been appointed committee to have fire houses in Sierra Vista Park built.

Wilmington, Cal.—Need of fire protection is being urged.

Meriden, Conn.—Fire Commissioners have voted to purchase gasoline fire engine.

Norwich Town, Conn.—Town is considering purchase of chemical engine and hose wagon.

Rome, Ga.—Council has decided to secure bids on auto chemical engine.—Address Chairman Harbin, of Fire Committee.

Burham, Ill.—Fire destroyed town hall; no fire protection.

Cairo, Ill.—Special Committee has recommended following improvements: 3,800 ft. standard fire hose, 600 ft. 1-in. hose, equipping hose wagon No. 1 with 2 gate valves, 85-gal. tank and hand chemicals, purchase of one combination hose and hook and ladder truck with 60 ft. extension ladder; also installation of approved fire alarm system. Councilman Koehler, Chairman Committee.

East St. Louis, Ill.—Fire Chief C. M. Burke will visit Cleveland, O., preparatory to purchasing aerial truck for No. 1 engine house.

Evanston, Ill.—Fire Department has $10,000 available for purchase of additional fire apparatus; extension of fire alarm system has been recommended.

Moline, Ill.—Plans are under way by city to change its present fire vehicles to autos and equip department with much better apparatus.

Springfield, Ill.—Erection of engine house at 11th and S. Grand st. is favored.

Richmond, Ind.—Council has passed ordinance appropriating $1,200 additional for west side hose house.

Scottsburg, Ind.—Purchase of chemical equipment is being considered.

Sullivan, Ind.—City officials are securing data regarding fire apparatus.

Sioux City, Ia.—Fire Chief Kellogg has recommended immediate purchase of small engine for hill district; bids will be asked.

Waterloo, Ia.—Council is considering $15,000 expenditure for better fire protection.

Newton, Kan.—Town will erect fire house.

Lexington, Ky.—Police and Fire Committee has recommended purchase of $6,500 steamer for fire department, also $6,000 aerial truck.

Chestertown, Md.—Firemen are raising funds for purchase of apparatus.

Mount Washington, Md.—Mount Washington Improvement Association is considering purchase of auto fire truck and hose wagon.

Grafton, Mass.—Town is considering need of additional engine.

Holyoke, Mass.—Site for High st. engine house is being considered.—N. P. Avery, Mayor.

New Bedford, Mass.—Fire Chief Dahill has recommended erection of central station, purchase of three automobile engines and 2,000 ft. of hose, installation of modern central office equipment and extension of water service.

Bay City, Mich.—Purchase of more modern equipment is being considered.

Flint, Mich.—City is considering need of chemical equipment.

Monroe, Mich.—Council will purchase 500 more feet of hose.

Albert Lea, Minn.—Supply Committee is considering purchase of fire hose.

St. Joseph, Mo.—Clinton Heights Improvement Association is urging erection of fire house.—C. F. McAnan, President.

St. Louis, Mo.—Purchase of 15,000 ft. of hose is being considered.

Baker, Mont.—Commercial Club has voted to purchase gasoline fire engine and 500 ft. of hose.

Atlantic City, N. J.—Council is considering erection of $35,000 fire station at Atlantic and California aves.

Paulsboro, N. J.—Council is considering new telephone ordinance under which borough will get fire alarm system.—Address Mayor Adamson.

Lyons, N. Y.—Purchase of 500 ft. of fire hose is being considered.—W. F. Classen, Chief Engineer.

New Rochelle, N. Y.—Architects have completed plans for erection of $18,000 fire station on North ave.

White Plains, N. Y.—Board of Fire Commissioners will install new indicators in fire houses when erected, nine additional fire alarm boxes, quantity of new wire and provide apparatus for two companies.

Kenmare, N. D.—Fire Department has asked Council for Ajax engine and 100 ft. of hose.

Collinwood, O.—Residents of north side of village are urging better fire protection.—J. F. Murray, Clerk of Council.

Kenmore, O.—Town will organize and equip volunteer department.—J. E. Bittikoffer, Chief.

Greencastle, Pa.—Purchase of truck is being considered.

Hazleton, Pa.—Secretary Snyder of Fire Committee, West Hazleton Council, has recommended installation of signal system, purchase of more hose and better apparatus.

Lebanon, Pa.—Rescue Hose Co. will purchase auto fire engine; Locomobile is favored.

Louderton, Pa.—Purchase of hook and ladder truck is being considered.

North Wales, Pa.—Firemen have decided to purchase chemical engine

Reading, Pa.—Liberty Fire Co. is considering purchase of $4,000 auto combination wagon.

Scranton, Pa.—Bureau of Fires has asked for $2,000 appropriation for repair of apparatus.

Scranton, Pa.—Council is considering $27,000 bond issue for construction of seven engine houses.

Georgetown, S. C.—Mayor H. W. Fraser has recommended erection of fire station.

Midvale, Utah.—Council will purchase hose cart, hook and ladder truck and chemical engine; department will be organized.—Hyrum Goff, Mayor.

Fredericksburg, Va.—Council will consider better equipping of fire department.

Edgewood, W. Va.—Purchase of hook and ladder truck is being considered.—J. N. Hogel is interested.

Ashland, Wis.—Fire Chief Sharp has asked for new equipment.

Milwaukee, Wis.—Citizens will vote in spring on $100,000 bonds for engine house.

Racine, Wis.—Rebuilding of State st. engine house is being considered.

CONTRACTS AWARDED

San Francisco, Cal.—Two combination chemical engine and hose wagons, to Robinson Fire Apparatus Co., $1,421 each.

Manistee, Mich.—Fire engine, to Nott Fire Co., Minneapolis, Minn., $4,000.

Yonkers, N. Y.—500 ft. hose, to Williams & Cullinan.

Sumter, S. C.—Fire department building, to D. F. Kelly.

Mitchell, S. D.—500 ft. of hose, to Northern Fire Apparatus Co., Minneapolis, at 80c. per ft.

Fredericksburg, Va.—1,000 ft. hose, at $1 per ft., and two muzzles and three tips at $52, to Fabric Hose Co. of New York.

Tacoma, Wash.—Stoddard-Dayton auto for Fire Chief Geo. McAlevy, to American Auto Co., $2,500.

BIDS RECEIVED

Jersey City, N. J.—Fire hose, Guttapercha & Rubber Mfg. Co., 5,000 ft. 2½-in. three-ply cotton jacket rubber-lined hose, Fabric brand, $1 per ft.

New Jersey Car Spring & Rubber Co., 2,200 ft. 2½-in. specially woven cotton jacketed hose, 400 pounds pressure to the sq. in., 85c. per ft.

Voorhees Rubber Mfg. Co., 2,200 ft. 2½-in. cotton jacketed hose, 90c. per ft.

Eureka Fire Hose Co., 2,200 ft. 2½-in. 4-ply cotton jacketed rubber-lined hose, $1.10 per ft.

ELECTRIC RAILWAYS

Alameda, Cal.—Council has adopted resolution in which Traction Co. is ordered to broad gauge High st. line, double track Park st., install two more switches and extend Santa Clara line.

Albany, Cal.—Application has been made to Board of Trustees for new franchise for electric street car line by Attorney M. R. Jones for East Shore & Suburban Railway.

Coalinga, Cal.—S. W. Morshead is interested in project to build 18-mile electric railway from Coalinga to Orr's.

Eureka, Cal.—E. E. Skinner is interested in proposed construction of electric railway from this city to Redding; cost $7,000,000.

Oakland, Cal.—Southern Pacific Railroad Co. is planning to extend electric line to San José from the Oakland system.

Pomona, Cal.—Ontario & San Antonio Heights Railway Co. will increase its capital; Ontario line will be rebuilt and connections made wtih number of cities.

San Francisco, Cal.—Link Belt Railway has been incorporated to construct broad-gauge railway in Placer County. L. T. Kitt, E. D. Kitt and W. S. Fox, incorporators.

St. Petersburg, Fla.—Bayboro Investment Co. is considering plans for construction of street railway.

Griffin, Ga.—H. H. Bass and J. P. Nichols, city, and C. M. Preston and D. A. Aiken, Macon, have applied to Council for franchise for electric railway.

Decatur, Ill.—The Decatur Southern Traction Railway Co. has been chartered to build electric railway to connect Decatur and Pana; capital $25,000. Wm. S. Carter, Geo. H. Winsor and Henry B. Davis, incorporators.

New Haven, Ill.—Town Council has granted Egyptian Traction Co. franchise.

Indianapolis, Ind.—Extension of College ave. car line is being urged.

Madison, Ind.—Cincinnati, Madison & Western Traction Co. will begin work on line to connect Scottsburg and Madison by April 1.—J. E. Greenley, President.

Vincennes, Ind.—Vincennes Electric Railway Co. will start work next spring on projected 14-mile gasoline motor railway which is to connect Vincennes, Lawrenceville and Bridgeport, Ill.—R. V. Stinson, Mt. Vernon, President.

Albia, Ia.—W. A. Bolan, New York, has asked for street railway franchise; Centerville Council has granted him franchise in that city.

Davenport, Ia.—Public Utility Co. in tricities has agreed to build interurban railroad from Davenport to Muscatine, if city will grant a 12-years' extension of their franchise.

Iowa City, Ia.—Board of Directors of Iowa City & Ottumwa Railway Co. has decided to build $2,000,000 road.

Topeka, Kan.—Topeka Railway Co. has decided to extend lines to Shorey.—E. W. Wilson, Pekin, Ill., President.

Cynthiana, Ky.—Cynthiana & Paris Railway is preparing to begin work in early spring on its projected 15-mile railway from this city to Lexington via Paris.

North Adams, Mass.—Company to be known as Taconic Street Railway Co. will ask Council and Selectmen of Williamstown for street railway franchise.

Little Falls, Minn.—Henry Diebel, Long Prairie, is promoting electric railway from Little Falls to Alexandria via Long Prairie.

Missoula, Mont.—Big Blackfoot Railway has been incorporated to build interurban electric railway; capital stock $250,000. John Gillie, C. F. Kelley and L. O. Evans, Butte, and John R. Toole and Kenneth Ross, city, directors.

Goldsboro, N. C.—Goldsboro Traction Co. will build 1¼ miles of new track at once.—E. T. Oliver, Raleigh, General Manager.

Whiteville, N. C.—The Whiteville Light & Power Co. has been organized to build street railway and power plant. W. T. Carrington, J. R. Williamson and P. J. Hufford, Vineland, are interested.

Wahpeton, N. D.—Construction of proposed Wahpeton-Breckenridge electric line will begin at once.—Matt Strum, Manager.

Cincinnati, O.—Cincinnati Traction Co. is considering extensive improvements.

Salem, O.—Peter McCave, Washingtonville, will organize company for construction of a 34-mile electric railway from this city to Youngstown via Albany, Gettysburg, Greenford, Calla and Loveland.

Okmulgee, Okla.—Citizens have subscribed $30,000 to build electric line distance of six miles.

Oswego, Ore.—Portland Light & Power Co. will construct line from West Oregon City to Oswego; distance four miles.

Norristown, Pa.—Residents of Upper Merion and others are interested in proposed construction of line from this city to Phœnixville, via Bridgeport, Port Kennedy and Valley Forge.

Tarentum, Pa.—Tarentum, Brackenridge & Freeport Street Railway Co. has been granted franchise by Borough Council to build interurban electric railway in Allegheny County.

Charleston, S. C.—Charleston Consolidated Railway, Gas & Electric Co. is considering construction of extensions.

Brownsville, Tex.—B. C. Stegman is interested in construction of railway between this city and West Brownsville.

Dallas, Tex.—E. L. Lancaster has asked for fronchise to construct electric line from fair grounds to city limits.

Houston, Tex.—Gulf Coast & Provident City Railway has been incorporated in Texas to build an interurban railway to connect Pierce and Provident City; length 35 miles; capital stock $50,000. Louis H. Schurlock, Emil Reinhold and T. J. Coughtin, Kansas City, Mo., and Carey Shaw and James T. Reaves, city, incorporators.

Temple, Tex.—The Belton & Temple Co. will construct 2½ miles of new track during year.—W. G. Haag, General Manager.

Quanah, Tex.—Construction street car system is being considered. Mr. Lowrey, Poteau, Okla., is interested.

Provo, Utah.—Construction of electric line from Salt Lake to Payson via this city is being considered. Simon Bamburger is interested.

Roanoke, Va.—Roanoke Railway & Electric Co. is surveying for proposed railway in Crystal Springs section.

Everett, Wash.—Sultan Railway & Power Co. is considering extension of line up Sultan Canyon Valley.

Montesano, Wash.—Grays Harbor Interurban Co. has applied for franchise for construction and operation of line of interurban railway over county roads in Chehalis County.

Spokane, Wash.—Spokane Traction Co. has made application for several franchises to improve city system.

Tacoma, Wash.—Citizens will vote on $1,000,000 bond issue for construction of system of municipal railways.

White Salmon, Wash.—Mt. Adams Electric Railroad Co. will begin construction about May 1 on the proposed 60-mile line between White Salmon and Glenwood, Wash.—C. L. Colburn, City Secretary.

Eau Claire, Wis.—The Chippewa Valley Railway, Light & Power Co. will build power plant and a 50-ft. concrete dam on Red Cedar River at Cedar Falls.—O. H. Ingram, President.

Edmonton, Alta., Can.—Edmonton Radial Railway Co. will soon place contracts for construction of about three miles of single track and one mile of double track.—Chas. E. Taylor, General Manager.

CONTRACTS AWARDED

Pecos, Tex.—Interurban for Pecos Valley Southern Railway Co., to W. L. Carwile, Dallas.

BRIDGES

Phœnix, Ariz.—Plans are being prepared by Engineers Mayberry and Parker, Pacific Electric Bldg., Los Angeles, Cal., for Center st. bridge, cost $100,000.

Parkin, Ark.—St. Louis, Iron Mountain & Southern Railway is considering erection of bridge over St. Francis River, one across White River at Augusta, and another across Black River at Paroquet.—M. L. Byers, St. Louis, Mo., Chief Engineer.

Los Angeles, Cal.—Council Committee is considering construction of viaduct over Pacific Electric System on Mission rd. at Rosehill; cost $80,000.

Montrose, Col.—County Commissioners have decided to construct bridge over Dolores River at Bed Rock; cost about $4,000.

New Haven, Conn.—Superintendent G. X. Amrhyn of Public Parks Department has recommended erection of bridge in Edgewood Park.

Atlanta, Ga.—City Engineer has estimated cost of erecting bridge at Alabama st. at $100,000.

Macon, Ga.—Grand Jury has recommended $500,000 bond issue for improvements, including better bridges and roads.

Savannah, Ga.—County Commissioners have adopted plans by W. F. Brown, County Engineer, for construction of a steel bridge across Herb River on LaRoche ave.; cost $7,000.

Washington, D. C.—District Commissioners have applied for $12,000 appropriation for repairing and strengthening highway bridge across Rock Creek at Calvert st.

Ida Grove, Ida.—County is considering construction of concrete stone culvert and bridges in place of wooden and steel structures.—Address County Auditor Varner.

Cambridge, Ill.—Board of County Supervisors will consider erection of bridge across Rock River at Colona.

Elgin, Ill.—Council has appropriated $2,500 for erection of several small bridges.

Fisher, Ill.—Highway Commissioners of East Bend and Condit townships have decided to construct bridge across Sangamon River at Newcomb Ford; cost $5,000. J. E. McJilton is interested.

Jacksonville, Ill.—Springfield-Jacksonville Traction Co. has decided to construct 17 bridges along road which is now under construction.—T. S. Davy, Chief Engineer.

Joliet, Ill.—Highway Board has adopted plan and proposition of Elgin, Joliet & Eastern Railway Co. covering proposed viaduct over company's tracks at Jackson st.; cost $65,000.

Peoria, Ill.—Board of Public Works has had plans prepared for $250,000 steel bridge.—George Simmons, Clerk.

Evansville, Ind.—Vanderburg Bridge Co. has been organized to erect bridge across Ohio River for trolley purposes.—W. H. McCurdy, President.

Des Moines, Ia.—Erection of bridge over river at North st. is being considered.

Alma, Kan.—Wabaunsee County is considering construction of steel or concrete bridge at Sweeny Crossing; cost $14,000.

Hutchinson, Kan.—City Engineer G. L.

McLane has about completed plans for proposed Main st. bridge.

Lecompton, Kan.—Bridge over Kaw River has been destroyed by floods.

Manhattan, Kan.—Blue Township will vote on bonds for construction of a permanent wagon bridge.

Topeka, Kan.—Shawnee County Commissioners have decided to repair bridge at Maple Hill; cost $9,000.

Westmoreland, Kan.—County proposes to construct bridge across Dempsey Creek; cost about $10,000.—H. G. Huckstadt, County Clerk.

Shreveport, La.—Council has passed an ordinance providing for construction of free bridge across Red River between Shreveport and Bossier Parish; cost about $200,000.

Millsdale, Mich.—Village Council and Township Board have adopted plans for construction of steel bridge; cost $3,500.

Halstad, Minn.—Construction of bridge across Red River is being considered. C. L. Sulerud is interested.

Jefferson City, Mo.—Plans are being prepared by Engineer E. F. C. Harding, Cole County, for steel and concrete bridge over Merceau River; also for 3-span steel bridge with concrete abutments over Osage River. —A. Dircka, County Clerk.

St. Louis, Mo.—Plans have been completed for construction of steel and concrete bridge on Kings Highway across railroad tracks; cost $500,000.—Orof Mann, Washington University, city, Consulting Engineer.

Omaha, Neb.—Douglas County Commissioners have decided to spend about $50,000 for construction and maintenance of county bridges.

Girard, O.—Erection of overhead bridge at foot of Main st. is being urged.

Oklahoma City, Okla.—County Commissioners have rescinded contract let to Kansas City Bridge Co. for erection of five steel bridges.

Astoria, Ore.—County Court is considering construction of bridge across Nehalem River.

Franklin, Pa.—County Commissioners have voted to build 30-ft. bridge in Oil City to take place of the Petroleum bridge.

Chattanooga, Tenn.—Plans are being prepared by E. E. Betts, Engineer of Chickamauga Park Commission, for bridge across Chattanooga Creek on Hooker rd.

Gainsville, Tenn.—Bids will soon be advertised for building bridge across Morton's Creek.—D. B. Johnson, Chairman Committee.

Houston, Tex.—Plans for proposed new bridge across bayou at San Jacinto st. will soon be presented to Council by Engineer F. L. Dormant.

Salt Lake City, Utah.—Emery County will expend $30,000 in replacing bridges on four rivers.

Hampton, Va.—Council has adopted ordinances for foot bridge and wagon bridge.—

Bellingham, Wash.—County Commissioners is considering election on $500,000 bonds for repairing bridges and roads.

Tacoma, Wash.—Committee of Streets and Alleys has recommended rejection of all bids for North 23d st. bridge.

Bluefield, W. Va.—Repair of two bridges is being considered.

Eau Claire, Wis.—Soo Railroad will build new steel bridge across Eau Claire River.

New London, Wis.—Plans are being prepared for construction of bridge over the Embarrass River.

CONTRACTS AWARDED

Downieville, Cal.—Bridge, to George Grant, Quincy.

Jacksonville, Fla.—Six Mile Creek bridge, to Converse Bridge Co., Chattanooga, Tenn., $13,030. Little Pottsburg bridge, to Phillips & Turnbull, city, $7,755. Trout Creek bridge, to Canton, O., Bridge Co., $3,971; fifteen other bidders.

Buckley, Ill.—Bridge, to Joseph Klein, Freeburg, $1,915.

Kearney, Neb.—Furnishing bridge work in Buffalo County during year, to Standard Bridge Co., Omaha, Neb.

Norwalk, O.—Bridge over river at Monroeville, to Pan-American Bridge Co., New Castle, Ind., $586.07, with allowance of $67 for timbers of old bridge.—J. E. Smith, County Auditor.

West Union, O.—Superstructure steel bridge, bids opened Jan. 12, to Brackett Bridge Co., Cincinnati, $1,277.—E. C. Zimmerman, County Engineer.

San Antonio, Tex.—Reinforced concrete bridge, to H. B. Thompson & Co., Birmingham, Ala., at $23,350.—Thomas E. Ramsay, County Auditor.

Richmond, Va.—Structural steel for viaduct of Richmond & Henrico Railway Co. at Marshall st., to Virginia Equipment & Supply Co., city, $150,000.

Tacoma, Wash.—Steel bridge, Puyallup ave., to Northwest Bridge Co., $89,500; other bidders: Lance & Peters, Seattle, $99,225; Wright & Sweeney, city, $99,937.50; International Contracting Co., Seattle, $120,000; Gertelson & Sons, city, $107,500; D. A. Williams Co., city, $100,000; C. F. Graff, Seattle, $92,260.

Ladysmith, Wis.—Bridge over river, to Menasha Woodenware Co., $12,500.

BIDS RECEIVED

Florence, Ariz.—Reinfd. concrete bridge, modified girder type, 700 ft. long and 20 ft. wide: Midland Bridge Co., Kansas City, Mo., $54,000; Raymond Concrete Pile Co., New York, N. Y., $62,300, alternate bid $48,320; Missouri Valley Bridge & Iron Works, Wichita, Kan., $49,900; Western Bridge Co., Sacramento, Cal., $47,963; R. R. Coleman, Phoenix, Ariz., $35,090; Engineer's estimate, $38,980.—R. R. Ryan, Phoenix, Designing Engineer.

Sioux City, Ia.—Bridge over Perry Creek, W. 6th st., Lewis & Leeder, low bidder, $5,860.

MISCELLANEOUS

Berkeley, Cal.—Commissioner of Public Works W. F. McClure is favorable to election on bonds to construct garbage disposal plant.

Berkeley, Cal.—Establishment of parks and playgrounds is being urged by Mother's clubs.

Oakland, Cal.—Bids will be asked by city for purchase of $3,733,000 improvement bonds.

San Francisco, Cal.—Park Commissioners have approved plans for proposed police station.

Bridgeport, Conn.—Board of Health is considering construction of garbage plant. —G. E. Ober, President.

Hartford, Conn.—Rev. Dr. Francis Goodwin has been named as member of commission to take charge of erection of proposed municipal building.—Mayor Hooker is Chairman.

New Britain, Conn.—Board of Public Works has decided to extend subway in Main st.; cost about $9,500.

New Haven, Conn.—Superintendent G. X. Amrhyn of Public Parks Department has asked for establishment of more parks.

New Haven, Conn.—Purchase of auto for Milk Inspector is being considered.

Wilmington, Del.—Plumbing Inspector Kane has recommended placing of two public comfort stations.

Decatur, Ill.—Public Improvement Committee is considering installation of garbage crematory.

Evanston, Ill.—City has $35,000 available for erection and equipment of departmental building at city yards.

Springfield, Ill.—Purchase of Forest Park with view to making it into public park is favored.

Indianapolis, Ind.—Board of Health is considering plans for larger and better hospital.

Marion, Ind.—Geo. McDougall, landscape gardener, Indianapolis, will prepare plans for beautifying park grounds.

Vincennes, Ind.—Establishment of pest house is being considered.

Des Moines, Ia.—Council has ordered erection of market house.

Hutchinson, Kan.—Park Board is considering establishment of two small parks.

Kansas City, Kan.—Council has approved Park Board's resolution for park at Georgia ave. and 26th st.

Lexington, Ky.—Professor J. W. Porter, Chairman Board of Park Commissioners, is urging need of parks and playgrounds.

Lexington, Ky.—Joint Improvement Committee will ask for $68,000 appropriation; $45,000 is for sweeping brick streets and cleaning macadam streets.

Louisville, Ky.—Board of Works has estimated cost of placing 1,707 street signs at $13,000.

Amite City, La.—Citizens have voted $6,000 bonds for erection of city hall.—C. M. Mixon, Mayor.

New Orleans, La.—Finance Committee has rejected, as too high, three bids received for erection of public baths on St. Mary st.; $8,700 available; plans will be revised.

Lawrence, Mass.—Aldermen have appropriated $5,000 for extermination of moth pests.

Lawrence, Mass.—Finance Committee will consider $50,000 appropriation for improvements in Ward 1.

Cadillac, Mich.—Board of Public Works has been instructed to prepare plans and specifications and estimates for construction of public dock.

Pontiac, Mich.—Council Committee is investigating street cleaners with view of purchasing.

Pontiac, Mich.—City Engineer has been directed to purchase metal house numbers at wholesale prices.

Hibbing, Minn.—Council is considering proposal to install five police telephone boxes.

Omaha, Neb.—City has sold $179,000 improvement bonds to Blodgett, Merritt & Co., Boston.

Dover, N. J.—Council has decided to remodel police headquarters and refurnish building.

Passaic, N. J.—Board of Health is considering data regarding garbage disposal plant.

Binghamton, N. Y.—Police Chief C. N. Goodrich has recommended purchase of automobile for department.

Elmira, N. Y.—Police Chief Cassada has asked for auto or horse and wagon and telephone call system for department.

Fulton, N. Y.—Mayor Conners is considering proposition for public market.

Lockport, N. Y.—E. D. Brownell, expert on water supply pipe line investigation, has informed city that it will cost $3,500 to bond tracks of International Railway Co. to prevent escape of electricity to pipe line.

Niagara Falls, N. Y.—Mayor Fuhrmann has recommended erection of city hall.

Schenectady, N. Y.—Public Works Department has asked $1,025 appropriation for flushing machine.

Yonkers, N. Y.—Firemen's Monument Committee is considering erection of firemen's monument.—E. J. Mitchell, Vice-President.

Bismarck, N. D.—Citizens will vote Feb. 10 on $50,000 bonds for erection of city hall.

Cincinnati, O.—Council has authorized Park Commission to spend $27,500 in carrying out landscape and lighting plans for Inwood Park; plans by Mrs. Grace Willard.

Sandusky, O.—Contract will soon be let by Board of Public Service for collection and disposal of garbage under five-year contract.

Youngstown, O.—Council has authorized purchase of auto patrol wagon; cost $3,500.

Youngstown, O.—General Improvement Committee will consider crematory question.

Claremont, Okla.—City is considering issuance of $15,500 bonds for city park building and $10,000 for parks.

Altoona, Pa.—Board of Public Works has appropriated $16,000 for cleaning paved streets.

Harrisburg, Pa.—Council has passed on first reading ordinance ordering purchase of motor cycle for police department.

Philadelphia, Pa.—Architect W. Bleddyn Powell is preparing plans for two police stations.

Pittsburg, Pa.—Council has been asked for $10,000 appropriation to conduct municipal lodging house.

Providence, R. I.—R. S. Bemis, Inspector of Plumbing, is urging erection of public comfort station.

Park City, Utah.—Council is advertising for bids for scavenger work.

Salt Lake City, Utah.—Councilman A. J. Davis has been named as chairman of committee to investigate establishment of city barn.

Salt Lake City, Utah.—Committee on Engineering and Sewage will recommend erection of six public comfort stations at cost of $4,000 each; plans by L. D. Martin.

Lynchburg, Va.—John W. Hughes, Lynchburg Billposting Co., 208 9th st., desires correspondence with manufacturers of street sprinklers, brooms and gutter sweepers.

Bristol, Vt.—W. A. Laurence has offered to erect public library if town will maintain it.

Oroville, Wash.—Erection of city hall is being considered.

Benwood, W. Va.—Council has decided to purchase wharf boat.

Huntington, W. Va.—Board of Commissioners is considering election on $80,000 bonds to purchase site for city building.

Moose Jaw, Sask., Can.—City desires City Engineer at once. Address the Mayor.

Ottawa, Ont., Can.—City will construct incinerator.—John Henderson, City Clerk.

CONTRACTS AWARDED

East St. Louis, Ill.—Garbage reduction plant, to U. S. Construction & Utilization Co., Rochester, N. Y.; cost $100,000; franchise has been granted to E. C. Bryant; city will pay $3 per ton for all garbage collected.

Portland, Ore.—Garbage incinerator, to Willamette Steel & Iron Works, 150 working days.

Greenville, S. C.—Addition to city hall, to J. F. Grandy, $5,270; four other bidders.

Lynchburg, Va.—Market house, to C. W. Womack & Co., city, $35,000.

Fairmont, W. Va.—Marion County jail and jailer's residence, to C. P. Howell, Clarksburg, $115,000; six bidders.

BIDS RECEIVED

Santa Monica, Cal.—Bulkhead, Ocean Park, J. G. Braun, $22,846, and Geo. D. Snyder, $25,280.

TOO LATE FOR CLASSIFICATION

STREET IMPROVEMENTS

Redwood City, Cal.—Bids will be received Feb. 14 for oiling and grading 4 miles of road.—P. H. McEvoy, Chairman, Board of Supervisors.

Peoria, Ill.—Bids will be received Feb. 7, 2 p. m., for surfacing roadway of 7th ave.—G. F. Simmons, President, Board of Local Improvements.

Rock Island, Ill.—Eleventh st. property owners are urging paving of that thoroughfare.

Atlantic, Ia.—City will take bids on about $60,000 worth of brick and asphalt paving Feb. 14.—Chas. P. Chase, of Clinton, Engineer.

Florence, Kan.—Bids will be received Feb. 7, noon, for macadamizing portions of two streets.—J. C. Riggs, City Clerk.

Lowell, Mass.—City Solicitor W. W. Duncan has filed petition with Superior Court for abolition of grade crossings at Western ave. and Fletcher st.

Jefferson Barracks, Mo.—Bids will be received Feb. 5, 11 a. m., for construction of roads and walks.—Captain S. H. Ford, Quartermaster.

St. Louis, Mo.—Municipal Council is considering paving of five streets with brick and three with asphalt.

Omaha, Neb.—Bids will be received Feb. 8, 8 p. m., for paving number of streets.—D. B. Butler, City Clerk.

Millville, N. J.—Good Roads Association, Cumberland County, is urging better highways throughout this section.

New York, N. Y.—Public Service Commission has sent to Ways and Means Committee of Legislature communication requesting $600,000 appropriation to go toward elimination of grade crossings within city.

Athens, O.—Bids will be received Feb. 7, noon, for paving Mill st. with brick.—W. B. Golden, Village Clerk.

Cincinnati, O.—Bids will be received Feb. 11, noon, for improvements of Gest st.—J. J. Wenner, Clerk, Board of Public Service.

Youngstown, O.—Bids will be received Feb. 4, noon, for seven jobs in street paving.—W. H. McMillen, City Clerk.

Altoona, Pa.—Citizens will vote April 26 on $260,000 bonds for improvements, including paving and resurfacing streets.

Pittsburg, Pa.—"Hump" regrading and widening ordinances have passed Councilmanic Committees on Survey and Public Works.

Wilkes-Barre, Pa.—Paving of Empire st. with brick is being considered.

Williamsport, Pa.—Property owners on W. 4th st., West End, are urging construction of sewer.

Amarillo, Tex.—City is considering $100,000 bond issue for street improvements.

Dallas, Tex.—City Engineer J. M. Preston has estimated that it will cost about $6,000,000 to pave all unpaved streets and $1,000,000 to grade same.

Salt Lake City, Utah.—Council has decided to pave Second West st.

Vancouver, B. C., Can.—Citizens have voted $350,000 by-law for street improvements and proposition to raise $100,000 for macadamizing and grading streets.

CONTRACTS AWARDED

Peoria, Ill.—Brick paving, Hayes st., to J. S. Allen, $2,317.76.

Creston, Ia.—25,000 sq. yds. 2½-in. asphalt, McAdam machine filler, 4 in. Portland concrete foundation to Hamilton and Schwartz, Shenandoah, $1.68 sq. yd.; bids not received in total, all by sq. yd. and ran from $1.68 to $2.15; 16,000 lin. ft. 5 x 7 x 20 concrete curb to Miracle Concrete Construction Co., Minneapolis, 34½c. lin. ft.—T. S. Delay, City Engineer.

St. Louis, Mo.—Rowan av., Parker Washington Co., $7,763.90; New Ashland, same, $8,694.56; Shawmut, same, $2,861.34; Theodosia, Academy to Union, same, $5,827; same street, Union to Arlington, same company, $7,551; Alfred, P. J. Clifford, Contracting Co., $8,418.90; Louisiana, G. Eyermann & Bro., $3,873.51; Henrietta, same, $5,779.50; 21st, Palm to Branch, Wm. H. Redemeyer, $2,947; same street, Penrose to Ferry, same company, $6,259.92; Potomac, F. Ruecking, $11,030.60; Pestalozzi, same, $21,611.94; Dakota, same, $4,256; Michigan, same, $6,685.19; Pennsylvania same, $8,931; Grace, same, $2,784.42; Fassen, same, $11,326.92; Spring, Bridge road, Fruin-Bambrick Construction Co., $13,795.28; 22d, James E. Perkinson, $37,410.11; Canaan, same, $14,395.34; Natural Bridge road, Skrainka Construction Co., $23,071.79; Connecticut, Granite Bituminous Paving Co., $24,281.44; Scanlan, same, $5,927.30; 22d, same, $37,270.84; Manchester, Schneiter Granite Co., $19,128.42; same street, Tamm to Prather, same company, $27,609.40; Arkansas, Winnebago to Miami, Barber Asphalt Paving Co., $5,764.88.

Portland, Ore.—21,629 sy. yds. bitulithic pavement to Warren Construction Co., city.

Chambersburg, Pa.—Rebuilding Orrstown-Shippenburg road to Ambler-Davis Co., Philadelphia, $38,300.45.

Alexandria, Va.—Cameron st. to McMahon, Co., Norfolk.

SEWERAGE

Elkhart, Ind.—Bids will be received Feb. 9 for about 3 miles of vitrified pipe sewers from 10 in. to 18 in. in diameter.—A. M. Smith, City Engineer.

Amesbury, Mass.—Board of Health is urging construction of sewer system.

Omaha, Neb.—Council has adopted ordinance for storm water sewer from 22d st. to Saratoga School; cost $1,000.

Las Cruces, N. M.—Special Committee, R. P. Porter, Chairman, has recommended that City Trustees provide for sewage system.

Bridgeton, N. J.—State Board of Health has approved plans for sewage disposal plant.—J. N. Glaspell, President of Council.

Ellendale, N. D.—Bids will be received Feb. 15 for laying 1,800 ft. 6-in. main on King st.—John King, City Auditor.

Youngstown, O.—Bids will be received Feb. 4, noon, for sewering five streets.—W. H. McMillen, Clerk, Board of Public Service.

Altoona, Pa.—Citizens will vote April 26 on $260,000 bonds; $60,000 will be used for sewers and $10,000 for diverting waters of Ginter's Run into Mill Run.

Reynoldsville, Pa.—Construction of $50,000 sewage disposal plant is being considered.

Austin, Tex.—Citizens will vote in March on $150,000 sewer bonds.

Dallas, Tex.—Chamber of Commerce is urging action in regard to sewage disposal.

Provo, Utah.—Mayor Ray has called attention to swampy and flooded condition of east and northeastern parts of city; recommends that immediate steps be taken to construct 42-in. cement concrete drain.

Hamilton, Ont., Can.—City Engineer Macallum has prepared plans for sewage system for east end annex.

CONTRACTS AWARDED

Toronto, Ont., Can.—Following sewers: Dingwall ave., Excelsior Construction & Paving Co., $707; Albany ave., Excelsior Construction & Paving Co., $1,337; Campbell ave., National Contracting Co., $829.

WATER SUPPLY

Milford, Ia.—City will take bids on water works Feb. 28; cost, $11,000.—Chas. P. Chase, Clinton, Engineer.

Kansas City, Kan.—Citizens will vote March 10 on $1,000,000 water works bonds.—P. W. Goeble Chairman, Water Commissioners.

Owensboro, Ky.—Effort will be made by Mayor and Water Commission to vote $30,000 for improvements in city water works.

Las Cruces, N. M.—Special Committee, R. P. Porter, Chairman, has recommended establishment of municipal water plant.

Louisville, Ky.—Water Works Board is considering following improvements: Installing one 30,000,000-gal. vertical steam turbine-driven centrifugal pump at river station No. 1, and necessary improvements and alterations to station; construction of concrete and stone in-take crib and tower, with screen chambers, for supply to both stations Nos. 1 and 2, and connection for future station when required; cleaning Crescent Hill reservoirs, cementing and grouting bottom and slopes of north reservoir, and construction of Wier tower and improvements to conduit between reservoirs; new stable and other changes and additions to buildings at 3d st.

Lowell, Mass.—Appropriation Committee has voted to recommend $200,000 appropriation for Water Board.

Trenton, N. J.—Water Board is considering plans for placing feed mains in Eighth Ward.

Schenectady, N. Y.—Bids will be received Feb. 9, 10:30 a. m., by Board of Contract and Supply for supplies for Bureau of Water, including 40 lengths 4-in., 500 lengths 6-in. and 250 lengths 8-in. bell and spigot pipe; 14,000 lbs. of special castings; 30 double nozzle fire hydrants, 40 sets telescope gate boxes, 40 6-in. and 10 8-in. double hub gate valves and 800 ½-in., 25 ¾-in. and 25 1-in. corporation cocks.—H. F. Miller, Secretary.

Kenmare, N. D.—Bids will be received Feb. 7, 8 p. m., for water main extensions.—A. G. Englahl, City Auditor.

Dayton, O.—Bids have been ordered advertised for 10 tons of 3-in. c. i. pipe, 15 tons of 4-in. and 200 tons of 6-in. pipe for Water Department.

Harrisburg, Pa.—The State Water Supply Commission has approved charters of these water companies: Pompeii Co., to supply in Washington township, Northampton County; Heidelberg Township Co., Schaefferstown village, Lebanon County; West Shore Co., East Pennsboro Township, Cumberland County.

White Lake, S. D.—Citizens will vote Feb. 8 on $11,500 bonds for construction of water system.

Pearsall, Tex.—Council has issued a franchise to local parties for water works system; franchise is for 25 years and will go into effect within three months.

Willard, Utah.—Construction of water works system is being considered.

LIGHTING AND POWER

Deland, Ala.—Business Men's Association is interested in installing electric light plant.

Greenwich, Conn.—City is considering changing present street lighting system from arc to tungsten lamps, and proposes to replace each arc lamp with four tungsten lamps; price paid for arc lamps is $100 each per year; new lamps will cost $24 per lamp per year.

Lansing, Mich.—Enlargement of municipal electric light plant is being considered.

Akron, O.—Bids have been ordered advertised for lighting, with gas and gasoline lamps, streets, alleys, etc.—D. W. Harter, Council Clerk.

Lincoln, Neb.—Council is considering plans for extension and improvements to municipal electric light plant; cost $32,500.

Warren, N. H.—Plans are being prepared by the Warren Water & Light Co. for removal of its power plant to Wentworth, distance four miles; company will supply electricity to Warren, Wentworth and Rumney for lamps and motors.—Edgar S. Carbee, Manager.

Ashland, O.—Ashland Gas & Electric Light Co. is considering erection of a power plant in the spring.—L. L. Blake, Superintendent.

Cleveland, O.—The Cleveland Electric Illuminating Co. has decided to construct new plant at foot of East 70th st.—Robt. Lindsay, Superintendent.

Ralston, Okla.—Bids will be received Feb. 7 for proposed light and water plant. T. E. Bryant, City Clerk; M. A. Earl & Co., Muskogee, Engineers.

Emporium, Pa.—Enlargement of municipal light plant is being considered; one 150-h.p. gas engine and a 60-cycle generator, 150-kw. 3-phase, also transformers and meters will be purchased.—Robt. Green, Manager.

Lebanon, Pa.—Daniel Weaver, North Lebanon Township, will erect a large electric plant.

Lock Haven, Pa.—Installation of electric plant at Mill Hall is being considered by Mill Hall Electric Light & Power Committee.

Vernon, Vt.—Plans are being prepared for installation of three additional units in power station of Connecticut River Power Co.; cost $150,000.—H. I. Harriman, President.

Pulaski, Va.—City proposes to install 150-h.p. boiler, 150-h.p. engine and 105-kw. generator, and change system from 133-cycle single-phase to 60-cycle 3-phase.—S. S Wall, Superintendent Light & Water Works.

Bridgeburg, Ont., Can.—Canadian Niagara Power Co. will erect power plant; cost $6,000.

St. John, N. B., Can.—Light Department has asked for $23,500 for 314 arc lamps.

CONTRACTS AWARDED

Jersey City, N. J.—Addition to Marion power station, to Headden Construction Co.

FIRE EQUIPMENT

Biwabik, Minn.—Bids will be received Feb. 12 for combination chemical and hook and ladder.

Palmyra, Mo.—Bids will be received Feb. 4 for 500 ft. of hose.

Havre, Mont.—Bids will be received Feb. 15, 8 p. m., for 1,000 ft. standard hose.—Jas. Holland, City Clerk.

Omaha, Neb.—Towns of Benson, Florence and Dundee will be thrown on their own resources for fire protection after July 1.

Passaic, N. J.—Changing of volunteer fire department into partly paid one is being considered, as is also purchase of two auto combination engines.—General Bird Spencer, Mayor.

St. Bernard, O.—Bids will be received Feb. 9, noon, for furnishing one combination fire wagon, carrying 200 ft. 1-in. hose, and equipped with extension ladder.—Geo. Schroeder, Village Clerk.

Wilkes Barre, Pa.—Council is considering purchase of fire engine for No. 8 engine house, hook and ladder truck and combination hose and chemical wagon.

St. John, N. B., Can.—Fire Department will expend large sum on hose, fire alarm supplies and hydrants.

CONTRACTS AWARDED

Philadelphia, Pa.—Water tower, to American-La France Co., $7,000.

Dallas, Tex.—Two fire stations, to J. S. Harrison, city, $8,800.

ELECTRIC RAILWAYS

San Francisco, Cal.—Upper Sunset Improvement Co. is interested in proposed extension of Masonic ave. line.

South Bend, Ind.—South Bend and Logansport Railway Co. has accepted franchise granted by Council.—T. P. Moredock, President.

Asbury Park, N. J.—H. W. Leland is obtaining consents in Asbury Park and vicinity for rights of way in behalf of trolley line to start from Cookman ave. to run on west side of Asbury Park to Asbury ave., and from thence by way of Colt's Neck and Jerseyville to Freehold.

Beaver Falls, Pa.—Council has passed first reading ordinance granting franchise to New Castle-Beaver Falls Street Railway Co.

Morgantown, W. Va.—Board of Directors of South Morgantown Traction Co. has authorized extension of its line south a distance of 13 miles to Marion County line to connect with the Fairmont and Clarksburg Traction Co.'s line, and east through South Park, Greenmont and Marilla.

Provo, Utah.—Jesse Knight has asked Council for street railway franchise.

BRIDGES

New Decatur, Ala.—Commissioners' Court will receive bids and let contract Feb. 14 for two steel bridges across West Flint.

San Francisco, Cal.—Erection of viaduct across East st. is being urged.

Alamosa, Col.—Bids will be received Feb. 11, noon, for construction of two concrete piers for steel bridge.—C. W. Comstock, Denver, State Engineer.

Gove, Kan.—Bids will be received Feb. 12, noon, for construction of three bridges.—G. H. Thomas, Clerk.

East St. Louis, Ill.—Bids will be received by Commissioners of Drainage District No. 1, St. Clair County, for construction of 60-ft. span and 80-ft. span bridges in village of Carondelet. L. C. Soucy, Chairman.

Schuyler, Neb.—Bids will be received Feb. 21, noon, for erection of bridge.—M. F. Shonka, County Clerk.

Oklahoma City, Okla.—Bids will be received Feb. 14 for construction of 14 steel bridges; cost, $24,500.—W. E. Moore, County Surveyor.

Altoona, Pa.—Citizens will vote April 26 on $200,000 bonds for improvements, including erection of bridge at 7th st.

Salina, Utah.—Commercial Club will petition County Commissioners for erection of bridge on Salina Creek near Gooseberry.

MISCELLANEOUS

Heber, Ark.—Bids will be received Mar. 2, noon, for erection of jail. F. W. Gibb & Co., Gazette Bldg., Little Rock, Architects. W. C. Watson, County Commissioner.

San Diego, Cal.—Wilbur D. Cook, Landscape Architect, Wright & Callender Bldg., Los Angeles, has prepared plans for municipal park for National City; provision will be made for playgrounds, comfort stations, etc.

Starke, Fla.—Bids will be received Mar. 7 for erection of $10,00 jail. Manly Jail Works, Dalton, Ga., Architects.—C. L. Peck, Chairman, Building Committee.

Fort Wayne, Ind.—Council has adopted ordinance asking for special levy for erection of municipal hospital.

St. Joseph, Mo.—Council has passed resolution instructing Superintendent of Buildings to have all houses numbered.

Lowell, Mass.—Appropriation Committee has recommended following appropriations for Park Department: $1,000 for sidewalks on North Common; $1,000 for care of trees; $1,000 for base ball grounds; $6,000 for moth extermination and $500 for Anne St. park.

St. Louis, Mo.—Bids will be received Feb. 4, noon, for erection of police station; also patrol house. G. W. Pipe, 2829 Manchester Ave., Architect.

Beatrice, Neb.—Erection of county jail is being considered.

Nutley, N. J.—Council is considering ordinance to establish system of garbage collection.—Councilman A. R. Carr, Chairman Local Commission.

South Amboy, N. J.—Construction of public dock is being discussed by Council.

Trenton, N. J.—Street Committee is considering cleaning of streets with machines.

Brooklyn, N. Y.—Construction of subway from Plaza at Prospect Park to Brownsville section by way of Eastern Parkway has been approved by Public Service Commission; approximate cost will be $5,000,000.

Jamestown, N. Y.—Plan to extend West Third St. over ravine by building an 1800-ft. steel viaduct is being considered; cost approximately $150,000.

North York, Pa.—Sanitary Committee, Frank Mayer, Chairman, will receive bids for removal of garbage in time to present to Council Feb. 11.

Greenville, S. C.—City Engineer is desired. Address the Mayor.

Norfolk, Va.—Beautifying Commission has received working drawings for proposed improvement at southern end of Stockley Gardens, and after getting an estimate from the City engineer on the cost of this improvement will submit estimate and plans to Council; cost about $8,000.

St. John, N. B.—Council has appropriated funds for various departments as follows: Public works, $78,000; sewerage maintenance, $15,000; lighting, $26,500; police, $48,000; fire, $65,000; ferry, $10,400, and various other works, totaling an expenditure of $480,277.—Wm. Murdoch, City Engineer.

CONTRACTS AWARDED

Omaha, Neb.—Garbage Collection, District No. 2 to Jas. Whalen; Districts 1, 3, 4, 5, 6, 7, 8 to Omaha Rendering and Feco Co.

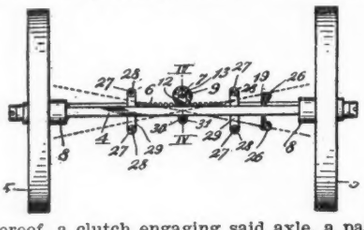
Whalen will be licensed to charge 10c. for cans holding less than 20 gallons, 15c. for cans holding 20 and not over 30 gallons, 25c. for cans holding 30 and not over 50 gallons and $1 per cubic yard for refuse. Prices to be charged by the Omaha Rendering and Feed Company in other seven districts will be as follows for garbage and refuse:

District.	Not over 20 gals.	20, not over 30 gals.	30, not over 50 gals.	R'f'se, cubic yard.
No. 1.....	$0.10	$0.15	$0.25	$1.00
No. 3.....	.15	.20	.30	1.00
No. 4.....	.15	.20	.30	1.25
No. 5.....	.10	.15	.25	1.25
No. 6.....	.15	.20	.30	1.25
No. 7.....	.20	.25	.35	1.25
No. 8.....	.20	.25	.35	1.25

PATENT CLAIMS

945,179. ROAD-GRADER. Winfield S. Livengood, Kansas City, Mo., assignor to Smith & Sons Mfg. Co., Kansas City, Mo. Serial No. 439,096.

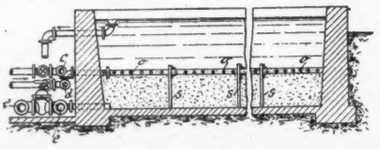
In a machine of the character described, a rear axle pivotally mounted in the frame



thereof, a clutch engaging said axle, a pair of parallel straps pivoted to the frame and said clutch, and means for actuating the clutch to control the pivotal movement of the axle.

944,528. APPARATUS FOR CLEANING FILTER BEDS. Zdenko von Wessely, Prague, Austria-Hungary. Serial No. 443,539.

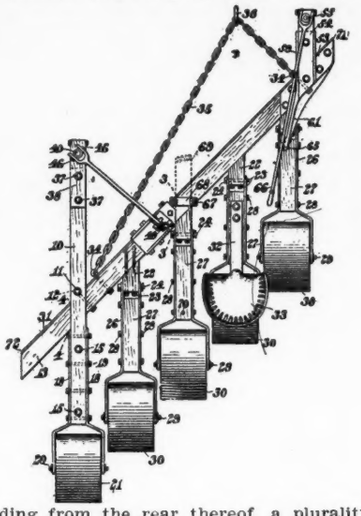
Apparatus for cleaning filter beds comprising separate headers, two sets of flushing pipes connected to said headers, and being alternately operable thereby, provided with uniform lateral perforations at



opposite sides only, approximately in the horizontal plane of the sand of the filter bed, and adapted to throw the sand into alternate mounds and hollows, and means for supplying cleansing fluid alternately to said two sets of pipes, from the separate headers, substantially as described and shown.

945,560. MACHINE FOR MAKING ROADS. Alvin O. Lombard, Waterville, Me. Serial No. 504,605.

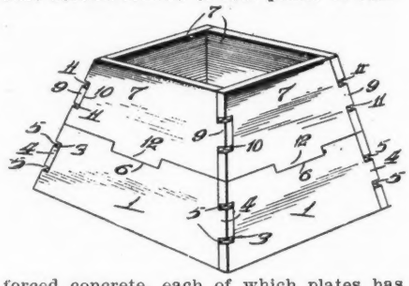
In a machine of the class described, the combination of a scraper; a rigid frame ex-



tending from the rear thereof, a plurality of frames pivotally secured to the rear of said scraper, and a roller in each frame.

945,597. BOX FOR STREET VALVES, FIRE PLUGS, AND THE LIKE. Edward Prendergast, St. Louis, Mo. Serial No. 478,474.

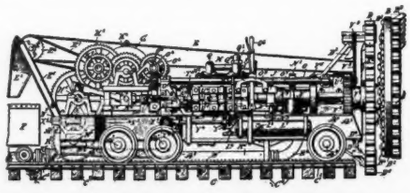
The herein-described truncated box for street valves and fire plugs, comprising a base section formed of four plates of rein-



forced concrete, each of which plates has tapering ends and is provided on each end with a recess and on the opposite end with an inclined projection, each plate is provided on its top edge with a recess intermediate its ends, a top section composed of four plates with tapering ends and having bottom edges of the same length as the top edges of the plates of the base section, each plate of the top section being provided on one of its ends with a recess and on the opposite end with an upwardly inclined lug and on its lower edge with a lug adapted to be seated in the corresponding recess of the plate on which it is positioned.

945,623. TUNNELING MACHINE. Louis F. Sleade, Denver, Col., assignor of one-half to Willis A. Sherwood, Silverton, Col. Serial No. 427,305.

A tunneling machine, comprising a revoluble cutter head, an electric motor for

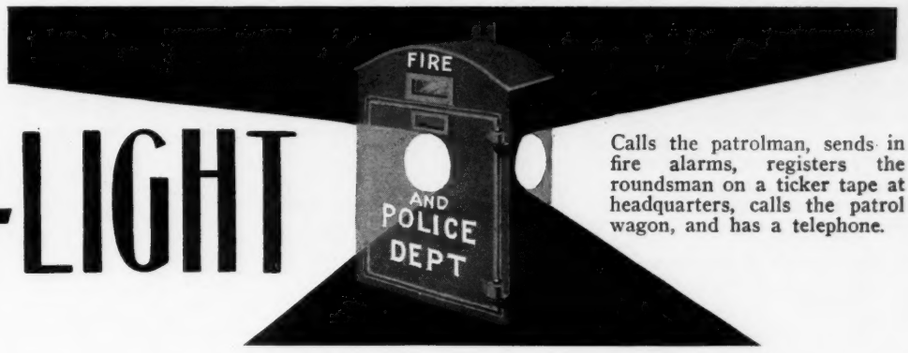


rotating the said cutter head, an internal combustion engine for imparting a reciprocating motion to the said cutter head in a forward direction, and means for connecting the said electric motor with the said internal combustion engine for imparting a return movement to the said cutter head.

945,999. ROAD CONSTRUCTION. Joseph H. Amies, Philadelphia, Pa., assignor to The Amies Asphalt Co., Philadelphia, Pa., a Corporation of South Dakota. Serial No. 481,173.

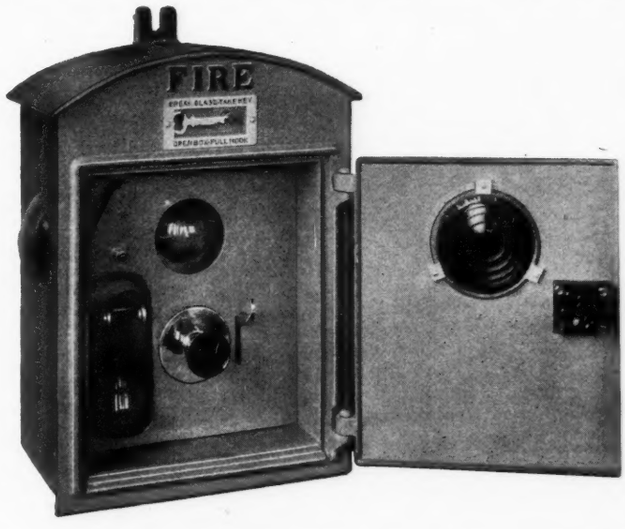
The here-indescribed method of building roads and the like which consists in taking soil and mixing therewith calcium oxid, then mixing with the mass asphaltic cement and the like and then placing the bituminized soil upon a heavy stone foundation, substantially as described.

Patrol FLASH-LIGHT System



Calls the patrolman, sends in fire alarms, registers the roundsman on a ticker tape at headquarters, calls the patrol wagon, and has a telephone.

A Combination Police and Fire Box, with three powerful red lenses that are visible from three directions for at least 500 yards in the daytime and for miles at night.

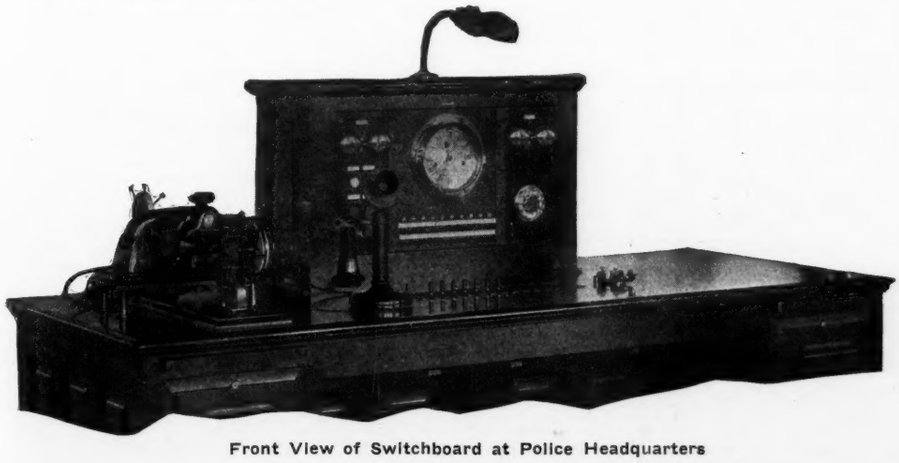


The boxes are located in each district, so at least one light is always within line of vision of the officer on that beat.

The telephone part of the equipment is of the best quality. All noisy lines and interruptions are completely removed.

The Patrol Flash-light system has passed the experimental stage. All installations are giving satisfactory results. The patrol boxes are heavily constructed and are neat in appearance. The outer door forms a moisture proof covering when closed.

The Patrol Flash-light system can be purchased outright and at a reasonable price, or a complete system may be installed and maintained, on a rental basis. Write us for details.



Front View of Switchboard at Police Headquarters

FLASH-LIGHT

The distinctive feature of this apparatus is the FLASH-LIGHT idea. It enables police headquarters, at any time of the day or night, to reach any roundsman *instantly*. Simply throwing a little switch lights powerful red lamps on any beat or all over the city. This signals the officers to come to the telephone for instructions.

RESERVES

Just think of it—you could assign your station reserves to regular beats and still be able to reach them as promptly as though they were asleep in the next room. The Patrol FLASH-LIGHT System more than trebles the efficiency of your force.

FIRE ALARMS

The illustrations show the location of the public key compartment. The hook is pulled in the usual manner—nothing new or confusing. The police are also notified along with the fire department. The lamp lights when the alarm is sent in and is extinguished when the fire chief replaces the broken glass. Illuminated flash-light pilots fire department.

REGISTRATION

Roundsmen's reports are automatically printed on a ticker tape at headquarters, by simply pulling the hook—the fire alarm circuit does not operate until the glass is broken. The telephone is not used in reporting. Constant attendance is not required at the headquarters' switchboard—the automatic registrations become indisputable records of each beat.

WAGON CALL

The wagon is called by depressing the button over the receiver, after the registration hook has been pulled. No telephoning necessary.

TELEPHONES

The talking apparatus is the standard Dean Electric Indestructible equipment. Dean telephone apparatus is well known all over the world by up-to-date telephone men. Ask any Independent telephone man. The Dean Electric Company is an old established concern—see Dun's or Bradstreet's.

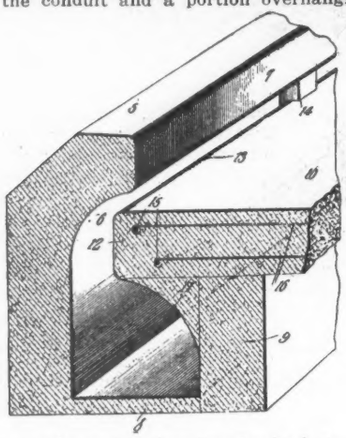
The Dean Electric Company

Elyria, Ohio, U. S. A.

San Francisco Kansas City

945,312. CURBING. Joseph Firth, Charlotte, N. C., assignor of one-half to John Wilson Haas, Charlotte, N. C. Serial No. 475,196.

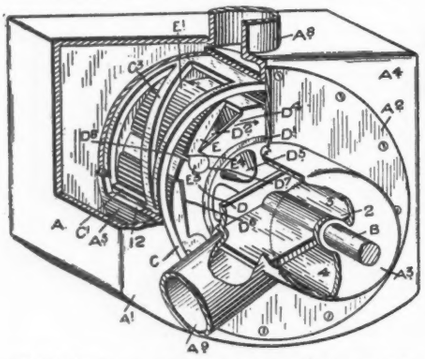
A curb and gutter, the curb being undercut to afford a conduit, the undercut of the curb affording the bottom and one side wall of the conduit and a portion overhanging



the conduit and having its edge in a vertical plane substantially medially of the bottom of the conduit, the gutter being also undercut to afford the other side wall of the conduit and a portion overhanging the conduit, said overhanging portion of the gutter projecting beneath the overhanging portion of the curb, the space between the said overhanging portion of the curb and the gutter being comparatively restricted, the conduit being of maximum width at its bottom and gradually decreasing in width upwardly.

945,953. ROTARY PUMP. Samuel Hughes, Lindsay, Ont., Can. Serial No. 485,517.

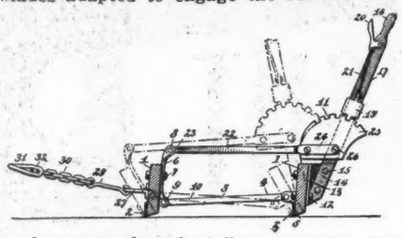
In a rotary pump, the combination with the casing having suitable intake and discharge ports, a shaft suitably journaled in the casing and the cam-shaped inner casing



attached to or forming part of the outer casing provided with a suitable peripheral port, of a circular solid piston suitably secured to the shaft and provided with flumes in the periphery inclined from the inner end to the discharge end, and blades hinged at one edge of the flumes in the piston and designed to be thrown inwardly and outwardly during its rotation by the cam-shaped casing, so as to close the peripheral entrance of the flumes as and for the purpose specified.

946,187. ROAD-WORKING MACHINE. Edward B. Winters, Coffeyville, Kan., assignor to The Coffeyville Implement & Manufacturing Co., Coffeyville, Kan. Serial No. 443,819.

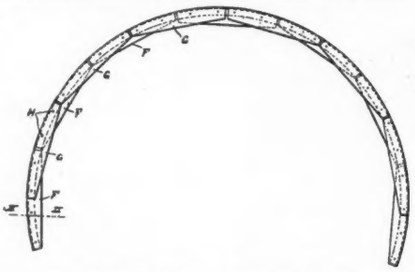
In a road-working machine, a forward and a rear beam provided wtih scraping blades adapted to engage the surface of a



road, means for pivotally connecting the said beams, controlling bars pivotally connected at their forward ends with the forward beam, a notched sector rigidly secured to the rear ends of said controlling bars, a projection at the back of the rear beam, a lever rigidly secured to said projection, and means carried by said lever for engaging the notches of said sector.

946,003. CENTERING DEVICE. Jacob S. Blaw, Pittsburg, Pa., assignor to Blaw Collapsible Steel Centering Co., Pittsburg, Pa., a Corporation of New Jersey. Serial No. 472,797.

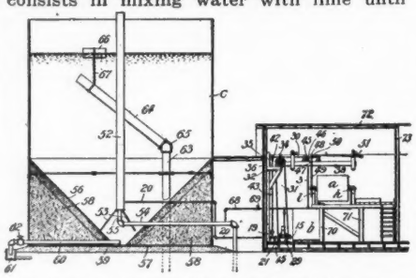
A curved stiffening rib for centering comprising a pair of flanged sections with their



flanges in opposition, a succession of overlapping plates between the flanges, and means for securing the flanges to the plates.

946,463. PROCESS FOR TREATING AND STORING WATER. William A. Powers, Topeka, Kan. Serial No. 227,845.

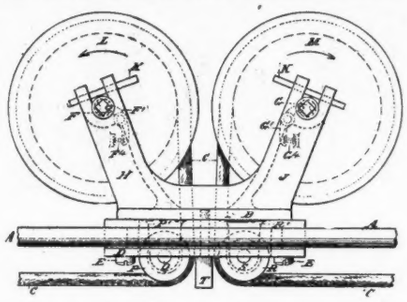
The process of purifying water, which consists in mixing water with lime until



the lime is thoroughly slaked and the mixture has a creamy consistency, then adding soda ash to the mixture, then storing it in a stirring tank to prevent settling, and finally mingling the mixture with the water to be treated as both are introduced into a settling chamber.

944,528. AUTOMATIC TRAVELING TAKE-UP FOR CABLE-CONVEYING APPARATUS. Charles R. Libby, Lowell, Mass., assignor to Lamson Consolidated Store Service Co., Newark, N. J., a Corporation of New Jersey. Serial No. 433,197.

In a cable conveying apparatus, a track or way, a driving cable adapted to propel carriers along said track or way, and means



traveling on said track and adapted to take up the slack and maintain a tension on said cable.

945,071. MANUFACTURING AND LAYING BITUMINOUS PAVING. Joseph H. Amies, Philadelphia, Pa., assignor of one-half to Charles F. Taylor, Philadelphia, Pa. Serial No. 424,344.

The herein-described method of making a composition for paving and the like which consists in mixing a fluxing oil with crude petroleum oil, then reducing these oils with gasoline and the like, then mixing this combination of elements while in a cold state with mineral materials, then adding thereto and mixing therewith pulverized hard bitumen, then placing the resulting compositoin upon a foundation and then applying heat thereto substantially as described.

INCORPORATIONS

The Emaus Light and Power Co., Emaus, Pa.; capital, $5,000.

Hartwick Power Co., Mfg. electricity for light, heat and power; capital, $100,000. Incorporators: Lawrence J. Mayer, 216 West 100th St.; Carleton Bune, 244 West 57th St., both of New York; Frank L. Hilton, 11 Bentley Ave., Jersey City, N. J.

The Hucknall Construction Co., Albion, Orleans County, N. Y.; general contracting and construction company; capital, $10,000. Incorporators: Thomas Hucknall and Mary Hucknall, 91 S. Clinton St., Albion, N. Y.; Albert J. Harradine, Adams Basin, N. Y.

Penn Central Light and Power Company of New Jersey, Camden; capital, $3,600,000. Incorporators: F. R. Hansell, William F. Eidell and John A. MacPeak.

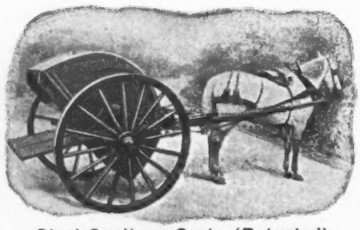
People's Electric Light, Heat and Power Co., Scranton, Pa.; capital, $50,000.

Suburban Transit Construction Co., Jersey City, N. J.; general contractors; capital, $25,000. Incorporators: Wesley S. Sawyer, 20 E. 38th St., Bayonne; Henry T. Randall, 8 Winthrop Terrace, E. Orange, both of New Jersey; Wm. L. Hunt, 773 E. 155th St., New York.

Syracuse Cement Distributing Co., Syracuse, N. Y.; deal in cement, sand, etc.; capital, $10,000. Incorporators: A. J. Walsh, C. A. Slocum, and K. M. Kelfrich, all of Syracuse, N. Y.

SANITARY CARTS

Made for 1 or 2 Horses



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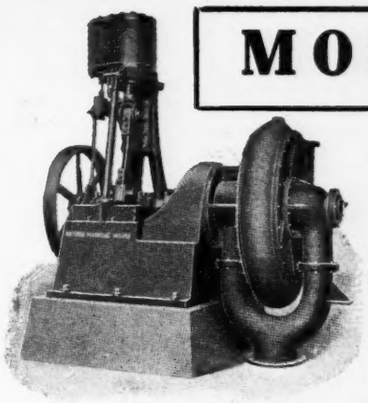

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The centrifugal pump, working with a rotary motion draws the sewage through an opening in the shell and delivers it through a discharge pipe of the periphery of the shell.

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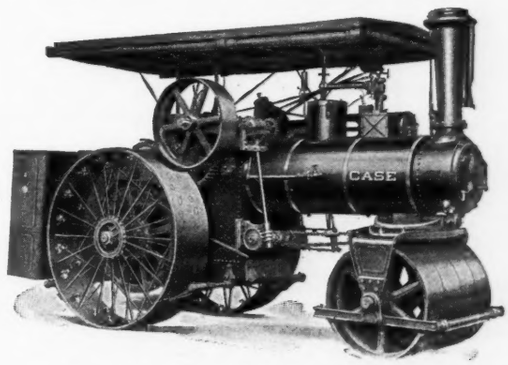

Case 8½ x 10-inch Cylinder 10-ton Road Roller

Time price, 10-ton, with Simple Cylinder, $2,200; with Compound Cylinder, $2,300

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Prices subject to change without notice

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PROPOSALS

ELECTRIC LIGHT PLANT

Sealed bids or propsals for constructing a complete Electric Light Plant in the Borough of Longport, N. J., will be received by the Borough Clerk, at Council Chamber in Borough Hall, between the hours of 11 and 11.30 A. M., Saturday, February 5th, 1910, at which time and place during a session of the Borough Council, the bids will be publicly opened and read.

The Borough Council reserves the right to reject any or all bids and the right to award the contract upon either item if it shall deem it for the public interest so to do.

No proposal will be received or considered unless accompanied by a certified check upon a National or State Bank or Trust Company, drawn to the order of Borough of Longport for the sum of Five Hundred Dollars ($500.00).

Surety Company Bond will be required in the sum of Five Thousand Dollars ($5,000).

Blank forms of proposals must be obtained from the Borough Architect, Room 600, Bartlett Building, Atlantic City, N. J., where plans and specifications may be seen.

H. A. STOUT,
WM. R. BRICE,
W. W. LAMBORN,
Committee.

WM. B. RIEBENACK, Architect.

BRICK PAVING AND GRADING

Caney, Kan., Jan. 19th, 1910.

Sealed bids will be received by the City Clerk of Caney, Kansas, up to 5 o'clock P. M., Wednesday, February 16th, 1910, for paving, curbing and guttering, and bringing to grade certain portions of Main street, Spring street, Third avenue, and the alleys running east and west in blocks numbers 10 and 11, original townsite of Caney, Kansas, as per the plans and specifications on file in the City Engineer's office.

Said paving to be made of brick and amounting to approximately 13,950 square yards.

Each bidder must deposit with the City Treasurer a certified check in the sum of $1,000.00 as a guarantee of good faith.

R. V. DODSON, City Clerk.

LINING RESERVOIR

Fort Mackenzie, Wyo., Jan. 17, 1910.

Sealed proposals in triplicate will be received here until 2 P. M., February 14th, 1910, and then opened, for lining with waterproofing felt and vitrified brick a million-gallon concrete reservoir near this post. Plans, specifications and necessary blanks furnished from this office on request. Envelopes containing proposals should be endorsed "Proposals for Lining Reservoir" and addressed to the Constructing Quartermaster, Fort Mackenzie, Wyoming.

BRICK PAVING

Mt. Pleasant, Mich.

Sealed proposals will be received at the office of the City Clerk until February 7th, 1910, at 8 o'clock P. M., for grading and paving with brick on a concrete foundation on certain portions of Broadway and Main sts., according to plans and specifications on file in the office of the City Clerk.

The Common Council reserves the right to reject any or all bids.

Each bidder shall deposit with his proposal a certified check or certificate of deposit for $1,000, payable to the order of the Mayor of the City of Mt. Pleasant, to be forfeited in case he shall fail to carry out his proposal, should the same be accepted by the Common Council.

All proposals must be made upon blanks which will be furnished on application.

By order of the Common Council.

H. H. HUNTER, City Clerk.

PUMPING ENGINES, BOILERS, CONDENSER

Poughkeepsie, N. Y.

Sealed proposals will be received by the Board of Public Works of the City of Poughkeepsie until 4 P. M., February 17, 1910, for

(1) One 5-million gallon high lift pumping engine.

(2) One 5-million gallon low lift pumping engine.

(3) One surface condenser.

(4) Two 125-horsepower tubular boilers.

Contracts for these items may be awarded separately, or two or more of them may be awarded to one contractor.

The contractor will be given considerable latitude in the design of the apparatus, and he shall submit with his bid drawings and descriptions to show clearly and in detail just what he proposes to furnish.

Certified check and bond required.

Specifications and form of contract may be obtained by addressing Robert J. Harding, Superintendent of Public Works, Poughkeepsie, N. Y.

The city reserves the right to reject any or all bids or to accept any bid.

(Signed) R. J. SHIELDS,
Clerk of Board of Public Works.

Dated January 20, 1910.

BRIDGE WORK

Cleveland, O.

Sealed proposals will be received at the office of the Board of Commissioners of Cuyahoga County, O., until 11 a. m. of the 5th day of Feb., 1910, for the construction of bridge work per Report No. 2567, New Railing, River Road, Rockport Township. Certified check for 10 per cent.

FRANK R. LANDER,
County Surveyor.
JNO. F. GOLDENBOGEN,
Clerk.

CAST-IRON PIPES

Bangkok, Siam.

The Minister of Local Government, Bangkok, Siam, is prepared to receive tenders for the Supply of Cast Iron Pipes and accessories for the water supply of the City.

Specifications with forms of tender and contract may be obtained on application to Secretary of the Siamese Legation, Washington, D. C., on payment of $1.25.

COMBINATION POLICE AND FIRE ALARM TELEPHONE SYSTEM

Fargo, N. D.

The City Auditor of the city of Fargo will receive until the hour of 5 o'clock p. m., Feb. 7, 1910, sealed bids for said city of Fargo, ten police call boxes, with telephones and necessary accessories, and one central switch board of sufficient capacity to care for 20 call boxes, with necessary batteries and all the necessary accessories for same.

Bidders will furnish full specifications, covering all necessary details.

A certified check in the sum of $100, to insure execution of contract, must accompany bid.

The City Council reserves the right to reject any and all bids.

By order of the City Council.

N. C. MORGAN,
City Auditor.

ELECTRIC LIGHT AND WATER WORKS PLANTS

Lafayette, Ga.

The City Council of Lafayette, Ga., would like propositions from parties, firms or corporations for the installation of an electric light and water works plants. Address

C. J. HAMMOND, City Recorder.

VOTING MACHINES

Office of the City Clerk,
Minneapolis, Minn., Jan. 17, 1910.

Sealed proposals will be received at this office until Friday, Feb. 11th, 1910, at 7.30 P. M., at which time said proposals will be submitted, unopened, to the City Council, for furnishing the city of Minneapolis with a number of voting machines, not exceeding 60. Said proposals to be submitted for furnishing said machines in lots of 10, 20, 30, 40, 50 or 60, at the option of said City Council. Said voting machines to be of a type approved by the Minnesota State Voting Machine Commission, and of a capacity sufficient to hold any election in the city of Minneapolis. Bidders will be required to exhibit to the City Council, or proper committee thereof, a machine, in working order, of the kind which it is proposed to furnish to said city.

A receipt showing the deposit of $500.00 in U. S. currency in the city treasury must accompany each proposal as a guaranty for the execution of the contract, if awarded. All proposals must be printed or written in ink, addressed to the undersigned, and marked on the envelope, "Proposal for Voting Machines;" said envelope also to bear the name of the person or persons by whom the proposal is submitted.

The right to reject any or all proposals is reserved.

By order of the City Council.

HENRY N. KNOTT, City Clerk.

PAVING AND CURBING

City Engineer's Office.
Burlington, Iowa, Jan. 20, 1910.

Sealed proposals will be received at the office of the City Clerk until 4 o'clock P. M., February 21, 1910, and acted upon at the first regular meeting of the City Council thereafter, to wit, for the following improvements, viz.:

To grade, curb with artificial stone and pave with mineral rubber asphaltic concrete, Arch street, from the west side of Fifth street to the east side of Sixth street, and from the west side of Sixth street to the east side of Eighth street and from the west side of Eighth street to the west side of Central avenue, 40 feet wide between curbs and Central avenue from the south side of Arch street to the north side of High street, 32 feet wide between curbs, including all necessary intersections, said improvement to be on a five-inch concrete foundation.

Certified check of $500.00, payable to the order of the treasurer, to accompany each bid as security that the bidder will enter into a contract for doing the work and will give the necessary bond. Work to be commenced on or about May 10, 1910, and completed on or before September 10, 1910.

The cost of said improvement to be paid for upon completion thereof by special assessments against the property abutting or adjacent upon the said improvement, as provided by law, and the parts not so paid shall be paid in cash by the city upon final completion and acceptance of the work.

All improvements to be made in accordance with the plans and specifications now on file in the office of the city engineer, which plans and specifications are hereby referred to and made part of this notice. The City Council reserves the right to reject all bids.

J. F. WINTERS, City Engineer.

TILE AND SEWER PIPE PLANT

Location for tile and sewer pipe plant.

Good town on Seaboard Air Line Railway offers a material suitable for the manufacture of tile and sewer pipe; material, coal site in immediate proximity to each other, with good railroad facilities. Address J. W. White, General Industrial Agent, Seaboard Air Line Railway, Norfolk, Va.